TECHNOLOGY DEPT.

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LIV
No. 1402

SATURDAY, MAY 11, 1946
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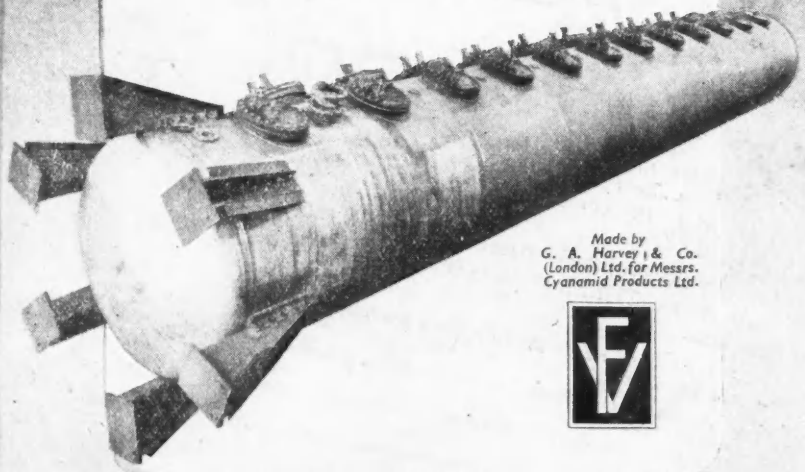

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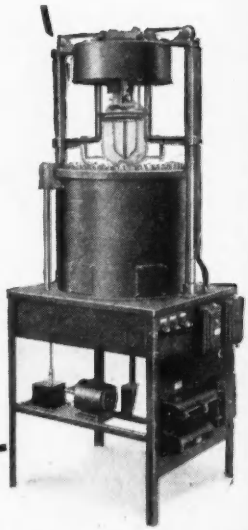

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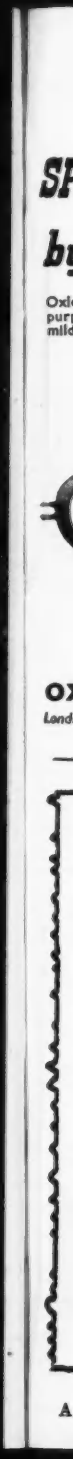

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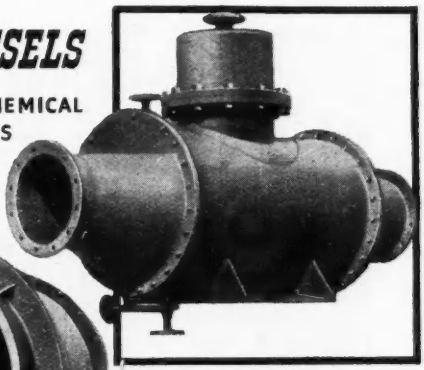

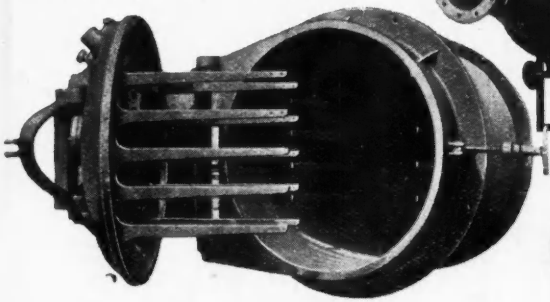

(Above) *Tubular Heater with special end transformation pieces.* (Left) *Dryer for special purposes, with hinged cover.*

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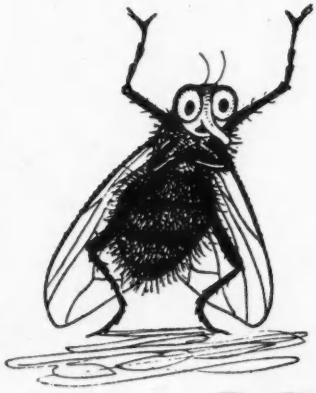

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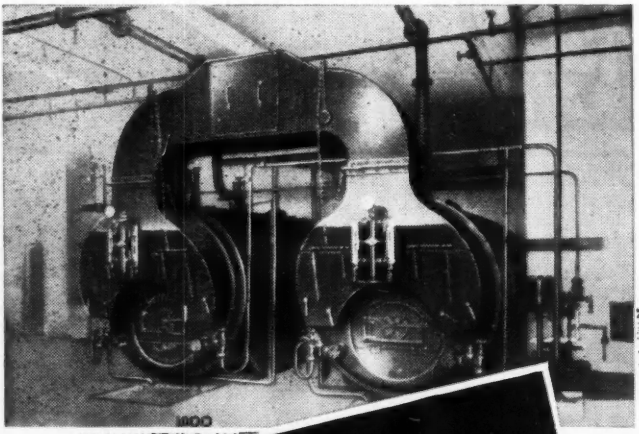

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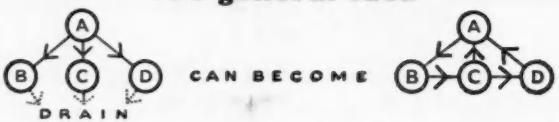

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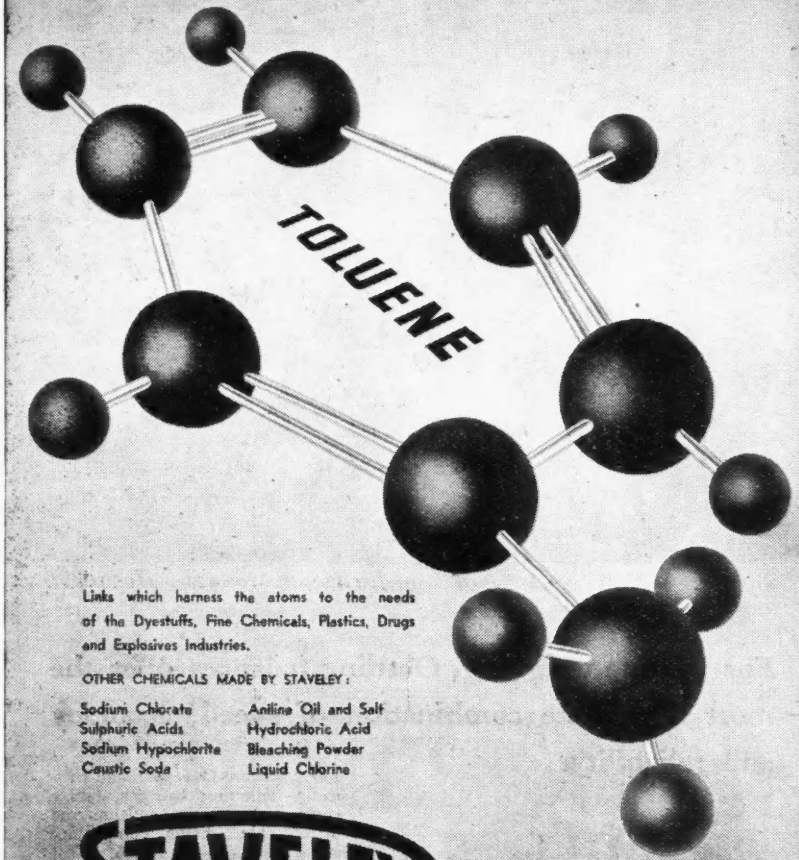

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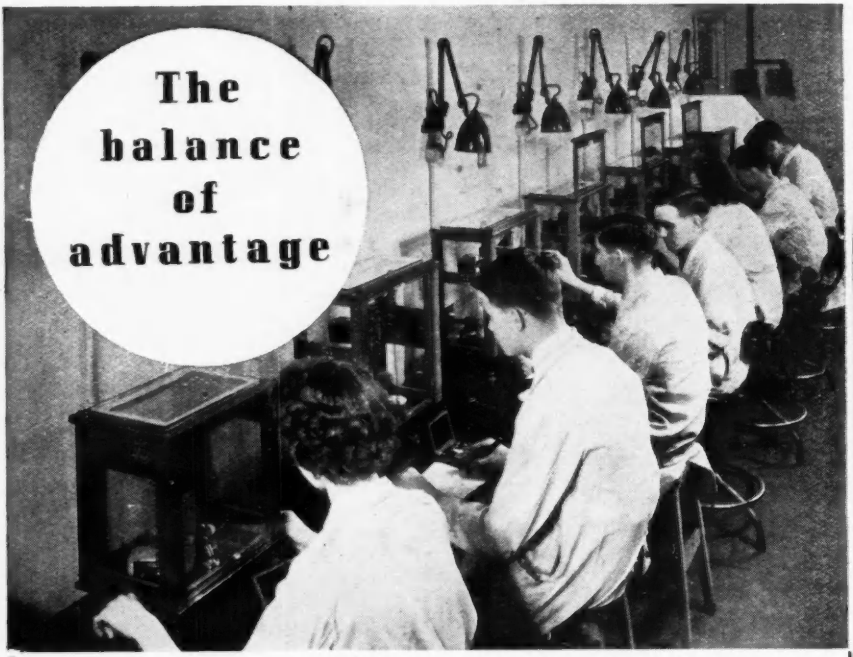

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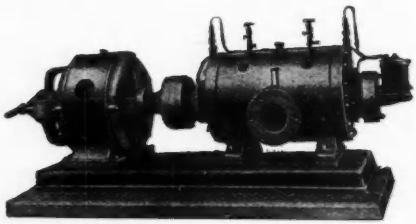

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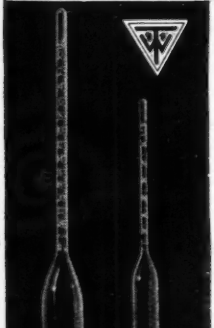

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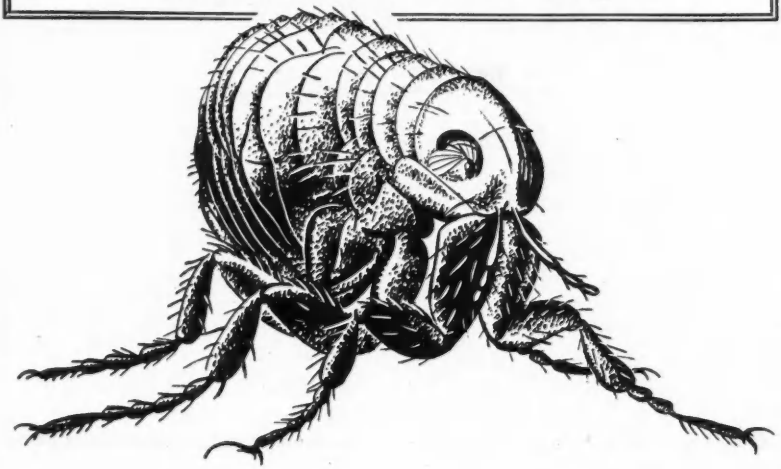

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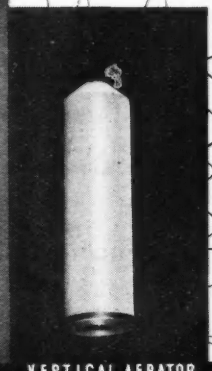

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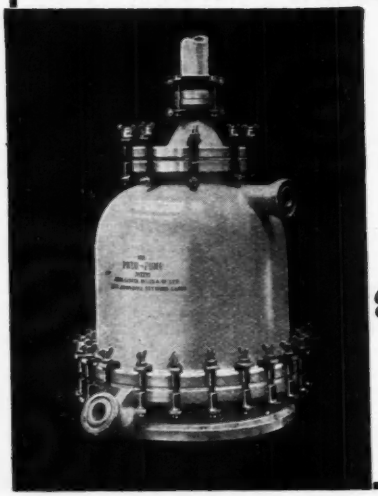

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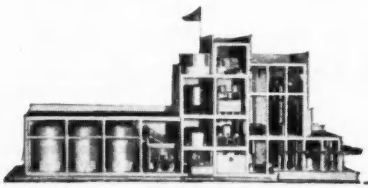

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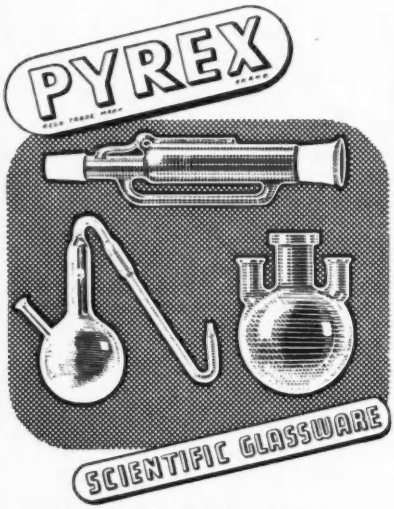

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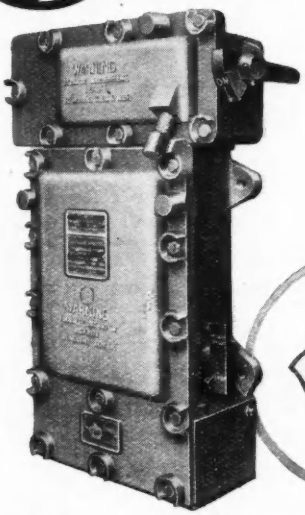

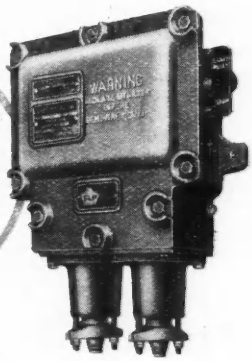

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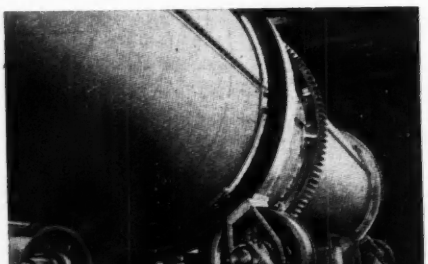

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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The Patent Literature

LONG-STANDING readers of this journal will have noted that we have, after a considerable interval, reinstated the practice of publishing weekly a list of the current patent literature, in so far as it affects the chemical and chemical engineering industries. It was with great reluctance that this feature was discontinued early in the war, and nothing but the severest stringency in paper supplies would have persuaded us to take such a course. At the present juncture we have thought it worth while to add a few lines concerning the meaning and the importance of this type of literature. Our oldest readers will doubtless know more about it than we do; but there may be some who will find it worth while to give a thought to the significance of this material, which at first sight may appear rather dull and pedestrian in character.

The essence of patent law is that, in return for disclosing all details of his invention, the inventor receives from the State what is virtually a monopoly in manufacture of an article or use of a process for the term of 16 years. Fees, of course, are payable to the Patent Office, in order that the office, through its examiners, may be self-supporting in the task of deciding what is or is not new and of material benefit to the individual or in industry. The fees are not exceptionally high, but in the aggregate they mount up, especially when—after a patent has been granted and sealed—there are graduated renewal taxes payable from the fifth year onwards. Nevertheless, each year thousands of inventors in all matters where useful improvements can be made still find it of advantage to patent their inventions and discoveries, paying the requisite fees. That alone should suffice to point out that the subject matter of these patents is valuable.

In accordance with the law, the text of the inventor's specification has to be printed and in due course comes on sale at the Patent Office at a nominal price. As a further convenience for those who wish to read and learn the trend of events, abstracts of newly-published specifications are published in the *Official Patents Journal*. That journal also contains a weekly list of the titles and names of inventors for provisional specifications lodged with the Patent Office, as well as similar lists of the complete specifications, deposition of which is essential before a patent can be granted. At the stage of provisional specification nothing more than title, date of application, and name

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of inventor, is made public. It is only after the full specification has been carefully examined by the Patent Office and the patent has been duly granted that full details become available. In certain cases, however, it is found needful that full specifications be open to public inspection in order that objections may be lodged if there is reasonable cause. Even after the granting of a patent in the normal course there are opportunities for other persons to dispute the grant. It becomes obvious, therefore, that the Patent Office takes all reasonable care to avoid granting a State monopoly to any but those who are the first and true inventors.

Patent literature thus provides a true view of the current state of invention and discovery, and as such it certainly warrants perusal. It is for the general convenience of readers that some of the technical and trade papers should publish lists of those patent applications which are of interest in connection with a particular industry or a trade. That information is obtained from the *Official Patents Journal*, which is duly searched each week, to gather together the various items. In this, the technical and trade papers do a service to their readers, saving them the monotonous task of personally searching through the official lists. But while some readers consult this information merely to see the trend of current invention and discovery, being somewhat of an inventive mind themselves, there are others who profit by learning what may be new in the matter of a selling line, or of advantage to a potential user either in industry or as an individual.

Selling lines in various forms of merchandise sometimes appear on the market before the full patent specification has been officially published; in other cases, even quite soon after the provisional specification is lodged, when indication of " patent applied for " must be made to be within the law. Certain industrial exhibitions, also, are described as licensed by the Board of Trade within the meaning of the Patents Acts; in certain circumstances, those who exhibit their inventions here before final protection is obtained are in no way prevented from obtaining a valid patent. It is well that it is so, for trade and industry alike obtain the benefit of information which may go far in bettering things where improvement is needed, thus avoiding the delays consequent upon the time required to operate the official machinery of granting a patent. " Britain Can Make It " is to be the title of this summer's display of home-produced goods in London; and it is largely thanks to the ingenuity of her inventors that the country is able, at this difficult stage in her history, to provide material for such a show.

The publication of lists of new patent applications and of full specifications is no idle waste of paper in the technical and trade Press. As a service to the reader it is commended. But this information might become all the more valuable if readers considered these lists from every aspect of service to industry and trade. Just as the great library at the Patent Office in London may be looked upon as a gathering of all the floating literature which concerns manufactures or processes, so may patent literature be regarded as revealing current invention and discovery. The wise man looks through these lists and digests some of the things which he learns by his reading: his brain, likewise, may become active in the inventing direction, and he will get an extra feeling of buoyancy in life.

The addresses at which an inventor may be found are obtainable from information filed at the Patent Office, but a visit, either personally or through an agent, is necessary to obtain it, with previous knowledge of the reference number of the application or published specification. Benefits become mutual when inventors and potential users make contact. Therefore, it is well to keep in touch with the current patent literature. The advantages to be obtained are often immeasurable in terms of the cost of negotiations: for this is a question of making the fullest use of the inventions and discoveries of the human brain. The timely adoption of a new safety device, for example, may prevent a fatal accident; the installation of an improved process may appreciably cut the cost of manufacture of some product, which, in its subsequent utilisation in a manufactured article, once again attracts real benefit to the user.

Never before the present day has there been so much call, not only for complete co-operation between the manufacturers and the users of goods, but also for the added co-operation of the inventor, the man who has made a discovery or an improvement. As to the inventors themselves, once they have assured themselves of the protection afforded by Patents Acts, let them have no hesitation in bringing due notice of their inventions and discoveries to those papers which best serve their field of usage.

NOTES AND COMMENTS

Campaign for Research

FURTHER emphasis was laid on the importance of fundamental research by Dr. W. H. Glover in delivering the Mather Lecture at the annual meeting of the Textile Institute at Bradford on May 1. Although it was generally realised, he said, that the volume of our exports must be raised to a much higher level than in pre-war days, it had not in the past been as readily accepted that an important requirement in achieving this would be a widespread increase in scientific research throughout industry, and the immediate practical application of the results. New industries and novel products were created by the results of fundamental research. Dr. Glover illustrated this by recalling that two laboratory workers, Cross and Bevan, stumbled almost accidentally on the discovery on which the viscose rayon industry is based.

Creating New Products

ACCORDINGLY, industrial research should be encouraged to the utmost in universities, in research associations, and in industry itself. The creation of new products in industrial research laboratories added to the potentialities of our export market. The maintenance and improvement of the quality of our products was perhaps the most important requirement so far as this country was concerned. Here again constant research was essential. Further, applied research should result in reductions in the costs of production. First, then, there must be fundamental research, and second, its immediate application in industry itself if the survival of Britain's export trade—and, therefore, the country itself as an industrial nation—was to be assured.

Production Drive

THE Government's so-called " Production Drive " (alias " Prosperity Campaign ") does not appear to be meeting with the measure of success desired, so much so that further steps are to be taken in an effort to whip up some sort of enthusiasm for the scheme. It all arises out of the fact that the total man-power available to industry falls short of the figure considered necessary to attain the desired objective of increasing the volume of our exports to 175 per cent. of the 1938 figure. The cry consequently is for greater efficiency on the part of managements and more individual co-operation on the part of workers. The Prime Minister began it by coming on the wireless a few weeks back and telling us (in effect) to take off our jackets and get on with the job. We do not consider we are doing him an injustice when we say he met with a cold reception.

Further Appeals

MR. ATTLEE'S broadcast was followed by two London conferences—one of employers and the other of trade unionists—at which the facts of the position were put by Cabinet Ministers. Then came a series of regional conferences in which workers and employers co-operated, the first being addressed by Mr. Morrison. Now, according to a statement made at a Press conference last week, a second series of conferences, on similar lines, is being planned and other efforts to reach the public and drive home the position are to be made by means of posters, films, and discussions on the wireless. When the question was asked whether use would be made of Press advertising, the naive response was forthcoming that the Government considered this would put an unfair weight on the space for which they could legitimately ask. We doubt whether it is within their province to ask for any space.

Home Goods First

SOME indication of what industrialists feel about the Government's attempts to increase our export figures may be gathered from the preliminary agenda for the annual general meeting and trade conference of the National Chamber of Trade, which is to be held at Scarborough on May 20-22. One of the resolutions to be put before the conference is worded as follows: " This Chamber, while realising the necessity for a healthy export market fully to assist the nation's economic recovery, urges that the Board of Trade keep prominently in view the need for a more rapid release of consumer goods for the home market. It is of the opinion that the Government will fail to build up a prosperous export trade on discontent and frustration caused by conditions where the home market is starved in order, artificially, to stimulate exports. The

need for a restoration of the balance as between home and export markets deserves the most urgent consideration of the Governmet." We are convinced there is much to be said for this point of view. This conference should provoke some lively discussions, judging by the variety of topics on the agenda.

Synthetic Rubber Reports

IT is evident from the spate of reports on synthetic rubber, emanating both from this country and from the United States, that the position of the supplies of rubber and its substitutes is causing some concern in the industrial world. Two British reports, issued under the U.S.-U.K. Liaison Scheme, are compiled from information supplied from various sources to the Research Association of British Rubber Manufacturers. Unfortunately, the Ministry of Supply, which publishes these reports, has not yet recovered from the attack of a secrecy induced by the war, and the contents of the reports has to be regarded as confidential. The American report, however, denominated " First Report of the Inter-Agency Policy Committee on Rubber," bears no such proviso; and it is, in fact, a much more general document. Characteristically, it is printed on one side of the paper only. It is well worth reading, and contains two lists of recommendations for future policy, distinguished as " short-run " and " long-term " recommendations. The general aim of the former is to maintain stocks of rubber in the U.S., and it is advocated that Government powers to allocate rubber should be extended after June 30, the present date of their expiry.

State Control to be Relaxed

ALTHOUGH for the time being it is thus recommended that the Government should continue to own and operate enough synthetic rubber plants to satisfy domestic needs, it is categorically stated among the long-term recommendations that private ownership and operation of the synthetic rubber industry should be a major objective. The Committee feels that this will provide an important contribution to research and development; at the same time the Government should accumulate and maintain a strategic stockpile of natural rubber, held wholly apart from stocks in commercial circulation. While there should be legislation assuring a minimum use of synthetic rubber, this should be based on a policy of minimum Government interference and of maximum scope for private enterprise. It continues to be evident that private enterprise is not yet, in the United States, the economic crime that it is considered in many quarters here, and that it is even recognised there as the most likely motive power for useful research work. A valuable feature of the American report is the short final glossary of various rubber types and rubber terms—a useful aid to memory in these multi-alphabetical days.

The Ball-Clay Industry

THE introduction of labour from outside the ball-clay districts and, as an urgent expedient, the employment of German prisoners of war, in order to meet the increased demand, are among the recommendations of the committee set up by the Board of Trade recently to inquire into the difficulties affecting the ball-clay industry. The report of the committee has just been published as a White Paper. The recommendations mentioned are along the same lines as those recently made in respect of the china-clay industry. Unlike the latter, the British ball-clay industry is not confined to one area, but is to be found in three districts—North Devon, South Devon, and Dorset. The 90,500 tons of ball-clay produced in 1945 included 30,000 tons of the whiteware clays, and it is estimated that this year a further 40,000 tons of such clays will be required for the pottery inlustry.

Danger of Extinction

WAYS are suggested for speeding up mechanisation, especially in the open-cast works, and emphasis is placed on the importance of building up adequate stocks of the whiteware clays. The need to institute control over the export of such clays is also stressed. In the opinion of the committee, the output of this small but vital industry will gradually diminish, with severe consequence for the pottery industry, unless some sort of long-term policy is formulated. Co-ordination of this report with that on the china-clay industry (*see* THE CHEMICAL AGE, 1946, *54*, 252) was doubtless made easier by the appointment of the same chairman and secretary (Professor W. R. Jones and Mr. T. K. Rees) to each.

Recent Work on Casein

Research in Switzerland

(from a Special Correspondent)

INTERESTING contributions to the now formidable literature of casein research (*cf.* bibliography in Sutermeister & Browne, 2nd ed., 1937, and *U.S. Chem. Abs.* indexes) have recently appeared in Switzerland by Nitschmann and collaborators and in the U.S.A. by W. G. Gordon *et al.* (*Ind. Eng. Chem.*, 1946, 90). The present review deals mainly with Nitschmann and Lauener—or other co-workers—whose work is described in a series of articles in *Helv. Chim. Acta*, beginning with Part I in 1941 (*24*, 237), continued to date, and presumably not yet completed.

Determination of Formaldehyde

The first part describes a method for the determination of formaldehyde in formalin-hardened casein, and exemplifies incidentally the difficulties attending the quantitative determination of the amino acid content of proteins referred to by Sutermeister and Browne (p. 39). It had been supposed that the method of Highberger and Retzsch for estimating formaldehyde in tanned leather (*J. Amer. Leather Chem. Assoc.*, 1938, *33*, 341) would be equally applicable in the case of formaldehyde-hardened casein; but it was found that the results obtained by this method of analysis were too low. This was attributed mainly to the action on the formaldehyde of the increased concentration of sulphuric acid during distillation. Nitschmann adopted the following modification with which he obtained consistent results.

A sample weighing ½ g. is placed in a 500 c.c. distilling flask together with 230 c.c. of 0.1 *M* phosphoric, or 0.01 *N* hydrochloric or sulphuric acid; the end of the condenser or adapter is inserted below the surface of 8 c.c. of 1 per cent. hydrogen sodium sulphite solution in a 250 c.c. volumetric flask. Distillation is done at such a rate that about 7-10 c.c. remains in the distilling flask after about 1½ hours. A trace of stearic acid may be added to the sample to reduce foaming. It is essential to rinse down the sides of the flask occasionally and carefully to prevent sticking of the casein particles. After distillation also rinse the condenser and adapter and add the rinsings to the condensate in the receiving flask.

Dilute to exactly 250 c.c. and allow to stand for an hour to form the formaldehyde/sulphurous acid complex completely. To a 50 c.c. portion of this solution add 5 c.c. of 0.5 per cent. starch solution and titrate with 0.1 *N* iodine solution; then add 10 c.c. of 95 per cent. ethyl alcohol and stir, after which add 3 c.c. of a 5 per cent. sodium carbonate solution. At this point the solution is colourless. Titrate quickly with 0.01 *N* iodine solution. The maximum error by this method is said to be about 1 per cent. of the formaldehyde formed. Blank tests made with commercial and purified casein showed an apparent formaldehyde content of 0.03 per cent.

In the second article of the series (*loc. cit.*, 1943, *26*, 1069) work on the determination of formaldehyde in hardened casein is continued. The method previously described, of distilling with dilute phosphoric acid and titrating the formaldehyde in the distillate according to Clausen's method, is modified by addition of more water after the first distillation and repeating the distillation. In this way it is possible to split off formaldehyde quantitatively from all cold-hardened casein. With heat-hardened products (70°C.) it is necessary to distil again at the end with stronger phosphoric acid (15 c.c. conc. phosphoric and 120 c.c. water) and to make sure that the final material distilling over is free from formaldehyde as shown by the colour reaction of Rimini and Shryver with phenylhydrazine/hydrochloric acid and potassium ferric cyanide thus (2 c.c. $C_6H_5NHNH_2.HCl$ + 1 c.c. 5 per cent. $K_3Fe(CN)_6$ + 5 c.c. conc. HCl). This gives a fuchsin red colour in the presence of formaldehyde.

Part 3 is a quantitative study of the binding of formaldehyde in the hardening of casein (*loc. cit*, 1943, *26*, 1075), using either formaldehyde solution or gaseous formaldehyde. Hardened casein preparations were made, in some of which the casein was immersed in formaldehyde solutions of different concentrations, while in others formaldehyde vapour was allowed to act upon dry casein. In both types the time curve of formaldehyde combination was studied over a period of 30 days. Although the rate of formaldehyde binding had in every case gradually diminished it had in no case ceased. The formaldehyde content of the preparation depends on how long it is washed after hardening, or how long, in the case of gas hardening, it is exposed to air.

Water-Absorption Capacity

Water-absorption capacity of various hardened and unhardened caseins, in relation to the relative water vapour pressure of the equilibrium atmosphere, was determined (*loc. cit.*, *26*, 1084). This absorption capacity is reduced by hardening, the effect being greater in proportion to the relative

water vapour pressure. In the region of over 50 per cent. relative humidity formaldehyde-gas-hardened casein absorbs less water than solution-hardened casein. Maximum swelling (hydration) attained by immersion in water is less with gas-hardened than with solution-hardened casein. With both hardening methods the maximum suppressive effect on swelling is obtained when the formaldehyde content of the casein is between 1 and 1.5 per cent. The reduced swelling capacity characteristic of this hardening action is believed to be due to a principal valence union of protein molecules through formaldehyde.

Effect of Lysine and Peptides

Behaviour of the ϵ-amino groups of lysine and the peptide groups (*loc. cit.*, 1944, *27*, 299) is next examined. It was found that, in the action of formaldehyde on casein at room temperature and with a *p*H of 5-6, the free ϵ-amino groups of lysine play an important part. From a comparison of the ability to form compounds with formaldehyde between de-aminated and ordinary casein, and from the decrease in Van Slyke nitrogen in formaldehyde tanning, it is concluded that the free lysine amino groups combine with formaldehyde in the ratio of 1 : 1. For the first time it could be demonstrated beyond doubt that, in the reaction between formaldehyde and casein, the elements of water are split off. The condensed water was found to be equivalent to the quantity of formaldehyde combined with the lysine amino groups. It could finally be shown again that in addition to these amino groups there are yet other groups present in casein which bind formaldehyde even in weak acid medium. From various considerations and observed experimental results it is concluded that these must be peptide groups. The reaction between the peptide groups and formaldehyde, at least in the cold, is not merely a condensation. Experiments indicate that the characteristic tanning action of formaldehyde—loss of solubility, decrease in swelling ability—is of such a nature that, between the free lysine amino groups on the one hand and the peptide groups on the other, methylene linkages are formed which indicate a primary valency linkage between the protein molecules.

Reasons for the failure of the Highberger and Retzsch method for the quantitative determination of formaldehyde in hardened caseins are next discussed (*loc. cit.*, 1946, *29*, 174). Although it had been found earlier that formaldehyde could be quantitatively split off, even with casein, the same as with glues if distillation is done with very low hydrogen ion concentration, *e.g.*, with 0.1 *M* phosphoric acid, yet simple distillation with water vapour in neutral reaction did not ensure complete splitting off of formaldehyde. The reason for the disappearance of some of the formaldehyde could not at first be discovered. Yet it was of considerable importance, and the authors have continued their work to date with a view to finding a reason. In the first place they show that, of the three possibilities: (1) hydrogenation to methyl alcohol; (2) dehydrogenation to formic acid; and (3) irreversible combining with the protein or certain decomposition products thereof, the first two must be ruled out. Concerning the third possibility reference is made to a thesis study of casein hydrolysate by Signer and Arber (*Diss. Ch. Arber*, Bern, 1941) which suggested, in conformity with the authors' own work, that it was not casein but certain hydrolytic products that are responsible for the loss of formaldehyde. It is well known that all amino acids combine very easily with their primary amino group —formaldehyde. This is particularly the case with histidine and tryptophane. The extent to which these can retain formaldehyde in distillation with mineral acid was determined; and it was found that tryptophane, more particularly with strong sulphuric acid, irreversibly retains much more formaldehyde than with phosphoric acid. Glue and gelatine contain no tryptophane and very little histidine. It is thus clear that with proteins containing these two acids formaldehyde determination will be the more inaccurate the more strongly tanning or hardening is effected.

Influence of Temperature

Part 7 (*loc. cit.*, 1946, *29*, 180) deals with the effect of higher temperature (70° C.) on casein hardening. Usually the hardening of casein for the manufacture of artificial horn is done at room temperature with 5 per cent. formalin solution. But little information is given in the literature as to the actual optimum temperature for this process. In some cases hardening is done first at 30° and then again at 70°. The swelling characteristic of the product is of considerable importance and will be affected by the temperature of working. The formaldehyde content is no criterion, as already shown in Part 2. In the present investigation it was found that the formaldehyde absorption by casein at 70° exceeded 10 per cent. in five days. As an approximate measure of such absorption, weight increase may be determined during hardening of the casein, as with hot-tanned or hardened preparations it was found impossible to split off quantitatively the bound formaldehyde: a part remains irreversibly bound with the casein. The additional formaldehyde absorbed at the higher temperature, as compared with cold hardening, does not, however, increase hardening or tanning effect, as determined by reduced swelling of powder and wet tear resistance of fibres.

The final section so far published (Part 8;

loc. cit., 1946, *29*, 184) covers tests with acetylated casein (*cf.* Gordon *et al.*, *Ind. Eng. Chem.*, 1946, 90, on acetylated-, butyrylated-, and propionylated-casein). In Part 5 of the Swiss series reference was made to the importance of the free amino groups in formaldehyde casein hardening. New evidence was given there in support of the view, also held by others, that the free amino groups are essential if formaldehyde is to fulfil its proper function of hardening, namely, increased solubility in alkalis and marked reduction in swelling. By treatment with nitric acid casein is deaminised, and for each amino group removed one molecule less of formaldehyde is fixed —in cold hardening. Amino groups are replaced by hydroxyl groups, the reaction of which with formaldehyde is not yet clearly established. Another possibility of blocking the amino groups is by acetylation. In this way peptidine groups are formed, such as already exist in the protein in large number. Moreover, alcohol and phenolic OH groups are esterified. A comparison of the formaldehyde binding capacity and tanning (hardening) action of acetyl casein with the same properties of ordinary casein would give some insight into the chemical nature of the tanning process.

Preparing Acetyl Casein

In the preparation of acetylated casein the method of Schöberl and Krumey (*Beih. Z. Ver. deutsche Chem.*, 1942, *45*, 43) was used, *i.e.*, ketene was introduced into a sodium caseinate solution. From the slightly reduced formaldehyde-binding capacity of acetylated casein it must be concluded that the acetylated amino groups can still absorb formaldehyde (28 days gas hardening at 18°C.). In this direction no water is condensed. On the other hand, it was again shown that the free amino groups in ordinary casein form condensation products with formaldehyde. Attempts to harden acetyl casein in the cold did not succeed in achieving complete hardening, for a strongly acetylated and formalin-treated casein remained soluble in dilute soda lye owing, presumably, to the absence of stable bridge linkages. A higher temperature (hot-tanning at 70° C.) certainly increases insolubility, but the swelling power of such a preparation is far greater than that of ordinary casein cold-hardened at 18°C. These tests again confirm the decisive importance of the free amino groups in formaldehyde hardening.

In their work on the water absorption of plastics moulded from acylated casein, W. G. Gordon *et al.* (*loc. cit.*) treated casein with acetic, propionic, and butyric anhydrides under various conditions. It was shown that water absorption is curtailed progressively by (a) increasing the number of acyl groups incorporated in the modified protein, and (b) increasing the size of the acyl group. From the standpoint of developing casein plastic moulding powders this reduction in water uptake is not entirely beneficial, since it is accompanied by decrease in the strength of the moulded articles. When subsequently hardened with formaldehyde the brittleness of these casein plastics is their outstanding weakness. Possibly suitable fillers together with some other plasticiser than water would help; also acylation with higher fatty acid residues such as palmityl, stearyl, and oleyl, may give better results.

I.C.I. Post-War Development

£9,000,000 Dyestuffs Expansion Scheme

IMPERIAL Chemical Industries are to spend £9,000,000 on a scheme of expansion in the dyestuffs branch of their industrial undertakings. Of this sum, approximately £8,000,000 will be devoted to extending existing factories at Blackley, Trafford Park, Huddersfield, and Grangemouth, and the remainder to widening the research and testing facilities at present largely concentrated at Blackley, the headquarters of the Dyestuffs Division.

This Division of I.C.I. engages in many chemical activities far beyond the implications of its name, including chemotherapy, the high-polymer fields, rubber chemicals, and textile auxiliaries. The present technical staff, apart from those required for manufacture and maintenance of plant, totals 1500, of whom more than 600 are qualified chemists. This scientifically trained man-power will need to be increased in proportion to the general expansion. A 100 per cent. increase is the ideal requirement but, unless there is a radical and unforeseen change in the output of academically trained men, it is realised that no more than 60 per cent. will in fact be recruitable over the next five years. A 50 per cent. increase is regarded, however, as the absolute minimum.

To accommodate these additional scientific workers, together with the unqualified staff required as assistants, laboratory stewards and the like, and to ease the working conditions in laboratories already overcrowded, between 200,000 and 250,000 additional square feet of laboratory space will be necessary. This will call for a corresponding increase of technical equipment for the practice of organic chemistry, textile, rubber and resin technology, physics, biology, metallurgy, and chemical engineering. The established policy of acquiring the most up-to-date equipment will be continued by maintaining the closest contact with developments in the fields of scientific and technological instrument and machine making.

Achievements of Chemical Research

Public Exhibition to be Held in London

AN exhibition of chemical discovery, designed to show some of the major achievements of chemical research during the war, and to demonstrate their even greater importance in peacetime, is to be held at the Tea Centre, Lower Regent Street (corner of Jermyn Street), London, S.W.1, beginning on June 5. The exhibition will be divided into five main sections, each based on a great British chemical discovery which is not only notable scientifically but offers great potentialities for the common weal.

Combating Disease

One section, "The Chemist *versus* Disease," will be devoted to the part played by chemical research in combating disease and improving sanitation, the conditions of a century ago being contrasted with those of to-day. Particular emphasis will be laid on the sulpha drugs, penicillin and Paludrine (the latest and greatest anti-malarial), and their significance in chemotherapy will be explained. Paludrine will be shown in relation to the earlier specifics, quinine and mepacrine, and their efficacy compared. Exhibits will describe how Paludrine was evolved from the study of an entirely different molecular type (the pyrimidine nucleus). The relative simplicity of the drug will be illustrated by a diagram of the Paludrine molecule sketched into the space-lattice model.

"The Chemist and Your Food" will outline the part played by the chemical industry in modern agriculture. Although this section will naturally deal with synthetic fertilisers, it will be mainly concerned with the evolution of chemical methods for combating moulds, bacteria and weeds. The new selective weedkiller, Methoxone, will be the highlight, and the story of its discovery, development and use will be illustrated with models, diagrams, and photographs. It will be shown how Methoxone (2-methyl-4-chlorophenoxy-acetic acid) is related chemically to the "auxins" and certain synthetic plant-growth promoters. Its remarkable selective action upon dicotyledonous weeds will be depicted in another exhibit.

Chemical warfare against predatory and disease-bearing insects will have a section to itself. The modern insecticide "Gammexane" will be described in detail with the help of historical montages, a display of specimens, and molecular models of the four isomers of benzene hexachloride. Lists will show the numerous pests—domestic, industrial, and agricultural—against which the toxicity of Gammexane is already proved. The exhibit will also include a case of living locusts, for the control of which Gammexane has shown particular promise. A development of technical interest is the Gammexane smoke pellet, used to assess the sensitivity of various insect species to the insecticide.

A section on "The Chemist and Plastics" will centre round "Perspex" and polythene, two of the greatest recent discoveries in the field of plastics. The history of Perspex will be summarised, and a molecular model will illustrate the process of polymerisation of methyl methacrylate. Perspex exhibits will include noses, shields, and turrets of aircraft, corrugated sheets for roof lighting, surgical and dental equipment, prisms and lenses, as well as a large number of domestic articles. The polythene exhibit will give many people their first opportunity of seeing this latest achievement of British chemistry. Polythene is unique in being the simplest synthetic thermoplastic, composed of long methylene chains of 1000 units or more. This has been put forward in explanation of its remarkable electrical properties, which will be illustrated in many practical applications. Special displays will explain its contribution to the development of radar. The value of its electrical properties will be further shown in telephones, radio, television, and submarine cables. Exhibits will show its use as a waterproof packing material for drugs, notably mepacrine, and for a large number of domestic and industrial applications.

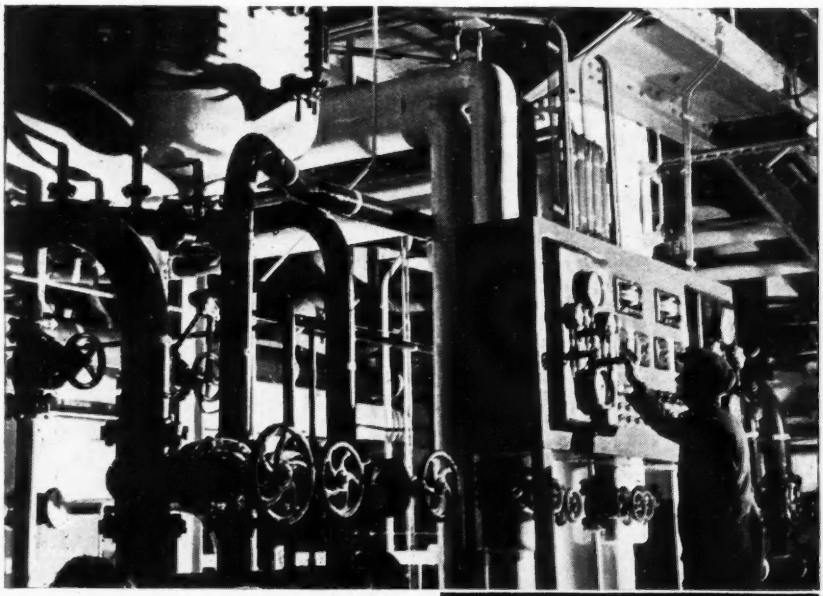
Fibre from Nuts

The final section will be devoted to "Ardil," the wool-like protein fibre made from monkey nuts. The underlying chemical theory will be illustrated by diagrams and models showing the breakdown of proteins into amino acids, and the reassembly of these into proteins of a different nature. This will be followed by a demonstration of the process used for the manufacture of Ardil, and exhibits of fabrics in which Ardil is combined with wool, cotton, and rayon.

The exhibition, which is organised by I.C.I., is being produced by Mr. Galvin Wright. The architect is Mr. Basil Spence. It will be open daily from 10.30 a.m. to 6 p.m. (Sundays, 2 to 7 p.m.) until June 28 inclusive. A charge of 1s. will be made for admission, and all proceeds will be given to the Empire Fund for Cancer Research.

Penicillin for the Public

Progress Outlined by the Minister of Supply



AT a Press conference held on May 1, Mr. John Wilmot, Minister of Supply, announced that the Government is about to make penicillin available, against a doctor's prescription, to anyone who needs it. It is hoped that the drug will be on sale at chemists' shops at the beginning of June. The price has not been decided, but it is stated that it will be very low.

The step announced has been made possible by an encouraging increase in output from the two British factories, at Speke, Liverpool, and at Barnard Castle, Co. Durham, both of which use the deep culture method of production that has superseded the original surface culture plants. The factory at Speke is owned by the Ministry of Supply and run by the Distillers Company, Ltd., as its agents; at the Barnard Castle factory Glaxo Laboratories, Ltd., employs its own plant in Government premises. Mr. Wilmot said that the two factories were now in full swing, and though they had been producing for only a few months, were already well ahead of their target figures. In the quality and scale of their production both plants would bear favourable comparison with those of any country.

These photographs, taken at Barnard Castle, show the refrigeration plant used to freeze penicillin for storage (top), and a girl worker, wearing a protective mask, spraying spores for the propagation of penicillin.

Montecatini Report

Concentration on War-Damage Repair

SINCE our publication of a brief description of how the Montecatini concern had emerged from the immediate stress of war (*see* THE CHEMICAL AGE, 1945, *53*, 264), an official report has been presented, at the first post-war general meeting, by the special commissioner appointed to take over the management of the concern, on the retirement, after the liberation of Italy, of the president, Signor Donegani, and most of his colleagues. The report states that, although it has not been possible hitherto to give a balance sheet and accounts, reconstruction work began as far back as September, 1943.

Effects of War Damage

War damage sustained by the group had been particularly heavy in Central and Southern Italy (*loc. cit.*), but the Northern plants had not been tried so sadly, though extensive damage had been caused by air raids to the superphosphate factories at Venice, the light alloy plants at Ferrara and Porto Marghera, the coke ovens at San Giuseppe di Cairo, and especially the plants of the Tuscany group (Livorno-Pontremoli). Immediate efforts were being concentrated on indispensable repairs to the largest possible number of partly damaged plants that could be put into operation again.

Owing to the lack of current and manpower, the group's mines at Grosseto, which furnished 92 per cent. of the Italian output of pyrites, have long been inactive. Two other mines of the Montecatini, those of Niccioleta and Boccheggiano, resumed output of pyrites in July, 1945, with a monthly output of 12,000 tons. The group's stocks of pyrites were estimated at 250,000 tons, but their distribution would depend on the chances of export. In sulphur, the situation left much to be desired. In view of the gigantic stocks in the U.S., and the fact that the sales price was fixed at $18 a ton, f.o.b., prospects could scarcely be regarded as favourable. The Italian sulphur industry would inevitably lag behind that of the U.S.A., at any rate until it succeeded in recovering its large Mediterranean markets. It would be essential to limit exploitation to the Sicilian mines that offered the most economic output—mines where the production in 1945 had amounted to about 60,000 tons.

The group's production of lignite, which had fallen to 2000 tons in January, 1945, had since recovered to about 15,000 tons a month.

Since the armistice (September, 1943) the Montevecchio subsidiary, the Società Italiana del Piombo e dello Zinco, had produced no lead or zinc metal. The lead foundries at San Gavino (Sardinia) were not able to resume activities until the end of 1945, when they received their first deliveries of coke. The electrolytic zinc plants at Porto Marghera, which were somewhat damaged by air raids, are being reconstructed. The Sardinian plants hold considerable stocks of zinc, which they are attempting to dispose of abroad.

Activities in the fertiliser factories had been restricted in 1945 owing to the lack of phosphates. Pre-war Italian consumption of phosphatic fertilisers amounted to 17 million quintals, of which 12 million were provided by the Montecatini; whereas in 1945, the group had been able to supply only 1,200,000 quintals. For the 1945-46 season, it had purchased 500,000 quintals of phosphates, from which it hoped to deliver (if transport difficulties could be surmounted) 8,500,000 quintals of superphosphates.

The crisis in copper supplies had paralysed the copper sulphate factories; in Southern Italy two small undertakings were recovering copper from cartridge cases and one from cupro-cements. The group had, however, taken precautions and amassed considerable stocks of copper which would not only cover the country's needs but, if necessary, be useful for export transactions.

Heavy Chemicals' Slow Recovery

The heavy chemical industry, intensively developed under the fascist régime of autarchy, was still depressed. Not until May, 1945, had production of sulphuric acid, soda, chlorine, phosphates for industrial use, bichromates, glue, and a large range of other products been resumed. Efforts to exchange these products abroad had so far proved unsuccessful. In the nitrogen industry, the Meran and Novara plants, still intact at the beginning of 1945, had since been destroyed by bombs, and the Apuania and Crotone plants damaged, though the latter were now being repaired. As a result, output of concentrates by the group in 1945 was 350,000 quintals less than before the war.

Of the three synthetic fuel plants of the A.N.I.C. (Azienda Nazionale Idrogenazione Combustibili), that at Livorno had been severely damaged, and together with that at Bari was currently being used by the Allies for storage purposes. The Novara factory was producing petroleum jelly. The Aziende Colori Nazionali Affini (A.C.N.A.), which had been closely linked with the I.G. Farben, had been able to use only a part of its production capacity, since it depended on the importation of raw materials from abroad.

Swiss Chemical Industry

Analyses of Companies' Reports for 1945

(from a Special Correspondent)

THE annual reports for the year 1945 of some of the leading Swiss chemical companies have been received in this country since the past difficulties and future prospects of the Swiss chemical industry were reviewed (*see* THE CHEMICAL AGE, 1946, *54*, 433) and, now that the collapse of the I.G. Farben's empire has assigned to Switzerland's chemical industry the leading position among Continental producers, the salient points of these reports assume more than merely topical interest.

Ranking foremost among Swiss chemical companies is the CIBA, A.G., Basle, renowned for its contribution to research and development, and its report provides an interesting picture of the company's world-wide interests. At the beginning of the year under review, the company was practically cut off from foreign markets; however, the conclusion, in March, 1945, of negotiations with American, British and French representatives—the so-called Currie Agreement—inaugurated an improvement that became more pronounced after VE-Day. The relaxation in the Navicert system, together with the termination of a number of control measures imposed during the war on raw materials, and the resumption of transport, enabled the company to replenish its stocks of raw materials and intermediate products. As a result, the curtailment of output in CIBA's Swiss works gave way to a gradual return to more normal working conditions. At the same time, the Federal authorities lost no time in replacing trade agreements which had become obsolete in consequence of the war, by a system of new trade and financial agreements, including, of course, the recent monetary agreement with Great Britain.

Peace-time Tasks

The company's production units abroad have proved to be essential bases for this international business, and they, too, profited by the improvement in conditions, both as regards production and sales. This satisfactory development, at home and abroad, resulted in an increase in turnover and net earnings, which will make it possible to turn to those tasks that had to be postponed while the war was in progress. In particular, maintenance and further expansion of the works within the framework of a long-term programme, and a further intensification of research activities, will again come to the fore in all spheres of the company's interests. It is, however, significant that the board is fully aware that the improvement in business conditions immediately following the war, as a result of the intermission of competition from war-ruined countries, will, at not too distant a date, be followed by a period of severe competition, which only those enterprises which have made due preparation will be able to weather.

Dystuffs and Intermediates

Turning to a discussion of the company's major fields of interest, the report deals at length with dyestuffs and intermediates, especially with those required in the textile industry. The programmes drawn up in a number of countries for the conversion of their economics to a peace-time basis assigns high priority to the manufacture of textile goods, and although requirements for textile dyestuffs are still below the pre-war level, sales have shown a favourable trend with the result that both the Swiss works and the majority of the company's foreign plants, are again working to full capacity. Reference is made to the fact that fundamental changes in foreign markets will necessitate the formation of new, and the expansion of existing foreign sales units.

In general, demand for dyestuffs has been concentrated on permanent dyes; however, since neither the CIBA nor other producers are able to cope with the large pent-up demand, emphasis has, of necessity, been turned also to other classes. Developments in the use of permanent dyes, the report points out, have by no means been completed and a continuation of research work on the broadest basis appears to be warranted. However, the large-scale introduction of the "Orema" and "Mikrosol" dyes, developed in recent years, is being retarded owing to the lack of chemical plant, a factor which serves to enhance yet further the need for an expansion of production facilities. Further progress is reported in the production of the high-grade "Cibanon" dyes, and at the same time, new items have been added to the series of water-soluble "Cibantine" dyes, designed for special purposes in the textile industry. Particular attention has been devoted to one of the CIBA's most recent achievements, *i.e.*, the so-called "Coprantin" dyes, and a number of gaps in the colour-assortment have been closed. While the company's attention had been focussed, in recent years, on dyes for vegetable fibres, a number of chrome-dyes has recently been brought out for the dyeing of wool, a field

to which the company is devoting growing attention. Among intermediates, new brands have been developed which make it possible to produce textile goods of higher quality in a shorter working time. Here again, technical and scientific research is receiving special emphasis.

Progress in Pharmaceuticals

As regards the manufacture of pharmaceuticals, one of the company's pillars of strength, the reports state that, as a whole, results of the three units at Basle, Horsham, and Summit (U.S.) showed an improvement last year. However, it is worthy of note that, while the works in this country and in the United States achieved remarkable increases in their turnover, the Swiss parent unit has been exposed to what the report calls a "certain stagnation," due to economic difficulties in most European countries. Demand from continental customers is very keen, but transport and payment difficulties, together with unsettled political conditions, have so far precluded adequate expansion in this direction. Among new products, special reference is made to "Antistin," a product indicated for the treatment of allergic disorders which, in combination with "Privin," is useful in combating hay fever. Another new substance is a synthetic œstrogen called "Fenocylin." In the year under review, penicillin has been marketed in ampoules and in the form of ointment. Since the company's own production could not cover demand, penicillin of other makes had, therefore, been sold. In the cosmetic sector there has also been an increased turnover and the company hopes to expand sales abroad.

Demand for plastics showed a marked increase during 1945, but the limited productive capacity prevented its being fully met. In the foreign sphere, the company had, therefore, to content itself with the conclusion of licence agreements. While such products as "Cibanoid" and "Melopas" have attracted great interest, growing attention is also being paid to new glues and resins. In order to expand this sector, the board has decided to carry out a thorough rationalisation of plant, production to be concentrated in the Monthey works.

As regards the results achieved by the CIBA's individual foreign subsidiaries, the Cincinnati Chemical Works, Inc., engaged in the manufacture of dyestuffs, reported satisfactory results; the same applies to the British dyestuff unit, the Clayton Aniline Co., Ltd., which had been spared any major war damage. The pharmaceutical unit in the United States, Ciba Pharmaceutical Products Inc., Summit, founded in 1936, reports a substantial increase in turnover, though earnings are limited by the heavy burden of taxation. However, this subsidiary contributes an appreciable sum towards the central research department in Switzerland. Ciba, Ltd., Horsham, also achieved satisfactory results. Results of the continental subsidiaries, which are largely dependent on the Swiss parent, have, of course, been affected by abnormal conditions. The French subsidiary at St. Fons reported more satisfactory results than in previous years, but the Italian unit, the Societa Bergamasca per l'Industria Chimica, Seriate, again registered a decline in both production and sales. The Polish unit, situated at Pabianice, remained practically undamaged and maintained a limited output in spite of being entirely cut off from Switzerland. A further point to be mentioned about the Swiss plants at Basle and Monthey is the fuel problem, which necessitated the use of various substitute fuels. The number of workers increased by about 11 per cent. and a reduced absenteeism resulted in an increase per man-hour.

As regards financial results, (figures in million Swiss francs) owing to increased turnover, sales rose from 34.71 to 39.58, while general expenditure increased from 13.47 to 14.83 last year. Research expenditure is shown separately (1) with 7.87, compared with 6.73 in 1944. Social expenditure amounted to 3.24, as compared with 2.89, excluding 3.2 (3.0), transferred from net profits. After 4.38 depreciation, against 3.55 in the preceding year, net profit is shown with 9,238,765 against 8,058,033 last year, out of which an unchanged dividend of 16 per cent. is being distributed. General reserve account stands at 7.63 and the sum of 1.5 has been transferred to the CIBA foundation for scientific, medical and technical research. Cash at bankers and liquid funds show a substantial increase from 35.6 to 47.4, of which 13.4 (12.9) are blocked assets, mainly in U.S. dollars.

Sandoz, A.G.

The broad lines of the speech delivered at the annual general meeting of Sandoz, A.G., Basle, by Professor A. Stoll, the vice-president, were identical with those of his colleague of the CIBA. However, his company appears to have had less satisfactory experiences in securing raw materials and materials for packing purposes. While the United States at first appeared to be in a position to supply chemicals for the manufacture of dyes, such as aniline β-napthol, and their derivatives, it is now almost impossible to purchase these from that source. Another difficulty has been caused by the cessation of imports of ampoules from the Jena glassworks, which had to be replaced by products from all parts of the world, including Mexico, which often were of inferior quality, leading to a general slowing down of production.

The speech contains an interesting com-

ment addressed to those who believe that the Swiss chemical industry has taken over a substantial part of the markets of the I.G. Farben. This applied only on a modest scale, for a substantial, if not a predominant, part of the business of the German dyestuff trust had been concentrated in Germany and in neighbouring countries, such as Austria, Czechoslovakia, Poland, and Hungary—in other words, in areas in which Swiss enterprises cannot at present operate. Instead of being able to take advantage of the end of German competition in these countries, Switzerland has lost the markets which she had built up patiently over a period of years, excluding, however, Czechoslovakia, where relations had been revived as a result of the trade agreement of last year. Another section of the speech of the vice-president was devoted to the problem of the academic training of a new generation of scientific workers.

Zofingen Report

The report of the Chemische Fabrik, vormals B. Siegfried, Zofingen, a smaller unit than the two companies discussed above, paints a somewhat more sombre picture. Although imports from overseas, from Spain and Belgium, put an end to the raw-material bottleneck, the lack of intermediates made itself felt. Domestic output is much too small and apparently no substitute has yet been found for German supplies. Oils, fats and sugar are in short supply, and the lack of coal provides yet another obstacle. Although exports have been increased by 20 per cent. in volume, their value remained unchanged. Competition by low-priced U.S. products is increasingly being felt and the future of Swiss exports depends on the development of wages and of the price of coal in the United States and in this country, as well as on post-war currency agreements. Most of the company's workers are now members of a trade union, whereas they were formerly quite unorganised. A collective agreement similar to that negotiated some time ago by the CIBA, has been demanded by the workers, and negotiations on this subject have not yet been concluded.

The foregoing summary of the reports of three different Swiss chemical companies goes a long way to prove that, regardless of the difficulties which are inevitable after six years of strife, Switzerland's industry has emerged from the war in a very strong position, technically, scientifically, and financially. Expansions of plant and an intensification of research, together with a return to more settled conditions on the Continent, and in the world in general, should provide ample scope both for Switzerland's chemical industry and for that of other nations.

Digest of Statistics

Chemical and Allied Figures

RISES and falls in production and consumption figures for the chemical and allied trades are indicated in the recently-published fourth issue of the *Monthly Digest of Statistics* (H.M.S.O., 2s. 6d. net).

Sulphuric acid production (in thousand tons), which fell from 153.9 in December, 1945, to 147.8 in January, dropped again in February, the figure being 141.4. Production of superphosphate also fell (to 77.2), after rising to 98.4 in January from 76.0 the previous month. On the other hand, compound fertiliser production maintained its recent improvement, the figure for February being 112.3, as compared with 102.2 for January, and 97.9 for December, 1945. There was a continuance of the decline in pyrites consumption; the February total (also in thousand tons) is given as 16.5, as against 17.4 for January, and 17.9 the previous month. Consumption of sulphur for the manufacture of sulphuric acid likewise dropped again. In December, 1945, it was 15.0; in January, 14.6; and in February, 14.1. Phosphate rock consumption, which rose from 65.5 in December, 1945, to 67.8 in January, dropped in February to 64.0. There was a decrease, too, in basic slag consumption, the February total being shown as 47.3, as compared with 52.4 for January, and 45.7 for December, 1945.

Stocks of pyrites have continued to go down, the relative figures being 89 (thousand tons) for December, 1945; 79 for January; and 70 for February. Similarly, stocks of sulphur for sulphuric acid manufacture were lower again, as is shown by these figures: 61.8 for December, 1945; 51.4 for January; and 49.3 for February. The drop in ammonia stocks (excluding ammonia produced in by-product factories and converted directly into ammonium sulphate) is shown as follows: December, 1945, 6.77; January, 5.66; February, 4.64.

Iron Production

Iron-ore production was maintained in March, the figure for that month being 256 (thousand tons), which is the same as for February and compares with 245 for January. Production of pig-iron went up from 144 in January, and 146 in February to 147 in March. Virgin aluminium production dropped from 3.09 in January to 2.58 in February (the March figures are not given), but consumption went up from 7.1 in January to 7.5 in February.

The estimated number of people employed in chemical, explosives, coke-oven and by-product works (figures in thousands), continued to decline, the totals for December, 1945, January and February, respectively, being 238.4, 235.9, and 233.4. Of the last-mentioned figure, 88.3 were females.

Surplus Scientific Apparatus

Parliamentary and Scientific Committee's Discussion

A FAIRLY full discussion of the disposal of surplus Government-owned scientific equipment was held at last month's meeting of the Parliamentary and Scientific Committee, held on April 16.

Captain A. R. Blackburn, M.P., reported that Mr. F. A. Cobb, M.P., had asked a question in the House in this connection, which had received a fairly friendly reply from the Minister of Supply (*see* THE CHEMICAL AGE, March 30, p. 329). He thought it was generally agreed it would be a good thing to send a deputation to Mr. Wilmot, but in view of the urgency of the matter, the Minister preferred merely for the points to be put forward direct to the officials concerned. Capt. Blackburn said he had had a considerable talk on the subject with Mr. Jenkins, Director-General of Disposals, and he was informed that an instruction was to be issued under the direction of the Lord President, to all Government Departments, informing them of the urgent need of scientific instruments and stores of various kinds, and asking them to declare their surplus stores.

Change in System?

Secondly, it was to be made clear to universities and scientific bodies who is responsible for the disposal of Government stores such as scientific instruments. Capt. Blackburn thought that the Government would announce that the Director-General of Disposals, who is an official of the Ministry of Supply, was responsible for the allocation of all these stores, and that it would change its present system, by which there is an absolute priority for all Government departments for such surplus stores, however unimportant the work.

A third point which had arisen regarding the supply of scientific instruments was that Mr. Cobb had evidence that there was something approaching a black market now arising in these stores. Capt. Blackburn had arranged for Mr. Cobb to see the senior official of the Ministry of Supply, but if the matter were sufficiently important the best course would be for a delegation to go from the committee and see the Minister and the officials concerned. Mr. Cobb said he thought the small sub-committee which had been set up could deal with the situation.

Mr. A. L. Bacharach stated that in addition to the difficulties to which reference had already been made, there was evidence that certain suppliers had equipment which they were not allowed to release. It was difficult to see through what governmental machinery one could secure greater fluidity of these materials. Capt. Blackburn said his information only referred to Government stores, and Mr. Cobb stated that dealers were organising some kind of a commercial ramp, which was getting behind the Government arrangement.

Professor E. N. da C. Andrade, F.R.S., asked what was the machinery by which the scientists could obtain the stores. Would they go through the University Grants Committee? Capt. Blackburn replied that an announcement would be made. The situation at the moment was that there was absolute priority for all forms of surplus Government stores to other Government departments. There was a predisposal priority which was given to the universities by the Director-General of Disposal on the advice of the University Grants Committee. Under the new arrangement the clear-cut responsibility would be on the Director-General of Disposals at the Ministry of Supply. Mr. F. C. R. Douglas, M.P., hoped that the University Grants Committee would not be further involved in this matter, which was outside their province.

Major R. F. Maitland inquired if the sub-committee was dealing with enemy scientific equipment, to which Capt. Blackburn replied that they had not yet considered this, but would do so, and Mr. Cobb said he understood that that kind of equipment, in so far as it might be surplus, would come under the Director-General.

Dr. H. R. Lang, referring to the point raised by Professor Andrade, said that the most practical method of obtaining this equipment was to visit the dumps. Professor Andrade replied that he had done that.

German Reparations

Dr. H. R. Lang also said that under certain conditions certain instruments from Germany would be available as reparations, provided they could not be obtained in this country. The Government, he said, circulates lists of scientific apparatus which is supposed to be surplus, and it is extremely difficult to make a selection from such lists. In some way the person who wants the material must see it.

Mr. L. J. Edwards, M.P., understood that the Director-General of Disposals had decided to appoint a special liaison officer to deal with the universities.

Capt. Blackburn said that at the moment, under Government instructions, the advice of the University Grants Committee had to be accepted. It was hoped that under the new arrangement the Director-General of Disposals would have discretion as to how he should operate.

Improved Petroleum Products*

Development of a Chemical Research Station

by Dr. A. E. DUNSTAN and Dr. D. A. HOWES

IN 1917 the research station of the Anglo-Iranian Oil Co., Ltd., was instituted in an old country house called Meadhurst in the parish of Ashford, Middlesex, and distant fifteen miles from the City of London.

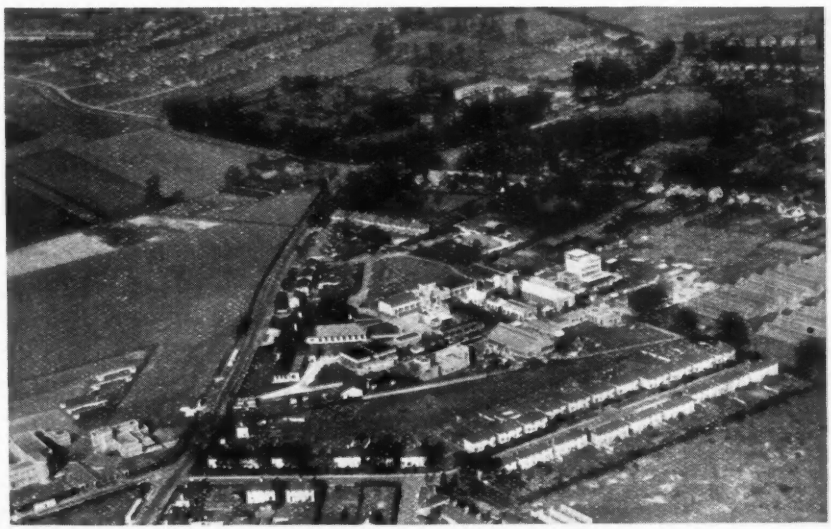
Industrial research was by no means common in those days and the company may be regarded as an early pioneer in establishing even a small laboratory devoted primarily to studying the impact of the science of chemistry upon a relatively new industry. The first world war was already demonstrating the need for this alliance.

A factor which influenced the decision to establish a laboratory had been the visit of a member of the head office staff to Persia in 1916 where a number of problems pressing for solution were encountered; and so the Meadhurst laboratory came into existence with a complement of two chemists. The old house was ample and commodious. It has long since been demolished but older members of the staff remember its considerable basement and outbuildings that had been adapted to laboratory use.

In those early days the company sold three commodities—"Admiralty Fuel" (which was a 65-70 per cent. residue from the initial distillation of the oil), a crude gasoline fraction, and a kerosine residue. The two latter were obtained by redistillation of the topped distillate of the initial operation, which was known as once-run distillate. Of these three primary Abadan products only the kerosine was refined. The "slumped untreated benzine" was sold as such to be subjected to refining treatment elsewhere. Abadan refined the kerosine residue by treatment with sodium plumbite— the so-called "litharge process"—and followed this by filtration through ignited bauxite.

The first problems to be tackled at Meadhurst were concerned with the possibilities of refining the gasoline cut. This was highly sulphurous and possessed an abominable smell. Very early experiments led to the discovery that certain oxidising agents would remove or, at any rate, modify the sulphur compounds and the first of these refining agents was sodium permanganate, soon to be followed by the better known sodium (and calcium) hypochlorite. On

* *The Naft Magazine*, April, 1946, p. 42.



An aerial view of Sunbury Research Station and its surroundings. The park recently acquired to provide space for expansion can be seen at the top, beyond the crossroads.

these experiments was based the first chemical patent taken out by the company, for the application of hypochlorite to the desulphurisation of petroleum distillates.

Next came a very complete investigation of the already established bauxite process. It was soon demonstrated that not only does this material effectively clean up and polish a kerosine cut, but also it can equally well completely desulphurise it and, furthermore, could act as an admirable refining agent for cracked spirit—an idea recently rediscovered in the American industry.

The First Expansion

Each idea envisaged and each problem solved gave rise to a multitude of others like the successive circumferential ripples on a pond disturbed at its centre. So by 1920 need for more accommodation was keenly felt. By this time the staff had swollen from two to a round dozen. Land was purchased to the south-west of Meadhurst, plans were developed and the first block on the present Sunbury site was erected in 1921.

This first real laboratory development was inspiring to those of us who had worked in the Meadhurst cellars. Not only were there a reasonably large general laboratory, balance room and furnace room, but also a good machine shop (that still functions to-day), a library and somewhat sparse office accommodation. Furthermore, there was ample land for future extensions. Soon there were a boiler house and a power house, and a high-pressure laboratory in which early cracking work was accomplished. There was a rather astonishing amount of pioneering activity in the old Meadhurst days. We had an active-minded staff, though sparse withal. By 1924 there had been a considerable growth both in the scientific and workshop personnel.

By the time these new developments were under way the company, realising the urgent need of keeping its men of science more closely in touch with academic thought, appointed two eminent men as advisers; these were the late Sir Jocelyn Thorpe and Professor R. V. Wheeler. And from their laboratories came a stream of new staff—a blood transfusion of some importance. Later we had Professor Soddy, Sir Ian Heilbron, Sir Robert Robinson, Sir Alfred Egerton and Professor Rideal, all of whom have played an important part in our history, perhaps especially in countering that mental inbreeding that is likely to occur in a community liable to be rather out of touch with the most recent thought in the universities.

From the very earliest days the importance of sound analytical practice was envisaged. Our analytical staff not only laid good foundations for our own internal company work, but they were foremost in co-operating with the standardisation activities of the Institute of Petroleum and the British Standards Institute.

Engine research and the problems appertaining to the internal combustion engine, its fuel and its lubrication, were contemplated from the first and a vast amount of first-rate fundamental work along these lines has been carried out.

Chemical research was, and is, always in the forefront at Sunbury, and later developments, such as the discovery of the alkylation process, redound to the credit of our laboratories which are naturally now far better housed, equipped and staffed than in the olden days. The same may be said of the physics and chemical engineering sides.

One activity of the research station must be briefly mentioned. Very many years ago Sunbury, realising that the chemical staff in the various associated refineries at home and abroad would benefit substantially from an annual conference, decided to call together every summer a meeting of its colleagues, and, of course, specially those from overseas. These meetings were regularly held up till the summer before the outbreak of the war.

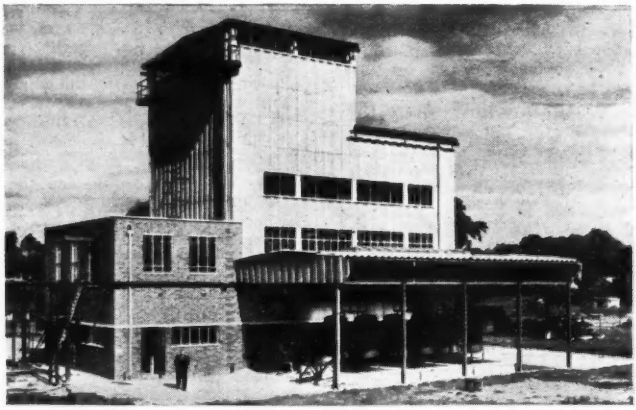
An Essential Service

Obviously, from these early beginnings the station has grown considerably and it is now one of the most up-to-date and best equipped petroleum research stations in the world and its scientific reputation is second to none. Sunbury to-day has several functions, but mainly it carries out research to produce improved petroleum products for the future and it is an essential service to the refining and marketing organisation of the company.

The greatest expansion of Sunbury took place in 1931, when the main block was erected to accommodate research, small-scale development work, and the administrative staff. In 1937 a new laboratory building was added to this block to accommodate work on process development and in the same year the research building was provided to house chemical and physical research. This was followed in 1939 by the first section of the large-scale development laboratory. The next building was the first aero-engine house, which was completed in the early days of the war.

The outbreak of war in Europe in 1939 caused a considerable interruption in Sunbury's activities. The uncertainties of that time made it necessary for several departments of the head office to be accommodated at Sunbury and several of the laboratories were refitted as offices, the displaced research staff being temporarily transferred to Llandarcy. As the war

situation crystallised, however, it became evident in early 1940 that the work of Sunbury relating to refinery operations at least would have to continue and to a greater extent than before the war; and partly to compensate for the loss of laboratory accommodation caused by the evacuation of the head office, the second section of the large-scale development laboratory was erected on the site of the old cracking shed. This was completed and occupied in the record time of about six months and during the next two years pilot plants were erected for the study of most of the newer refinery operations, such as alkylation, isomerisation, super-fractionation, etc., and work on these plants proved of considerable value in the planning and operation of the large-scale aviation fuel installation erected in Abadan. Developments in the performance testing of aviation fuels in engines made it necessary to erect a second aero engine house in 1943.



Pilot catalytic plant recently erected at Sunbury. The brick portion on the left houses the offices and laboratories connected with the pilot plant, which is in the tall part of the building. Its height is made necessary by the very tall reaction vessels used in the process.

Life at Sunbury during the war years was not without its excitements. Early in 1944, Sunbury was badly damaged and one night in February, in a short, but sharp, attack, almost every building on the site was pierced by incendiary bombs and both the physics and small-scale development laboratories were burnt out. These laboratories were, however, rapidly rebuilt and refitted, and the flying-bomb attacks in 1944 did Sunbury no further harm.

Brewing Technology

Lecture to R.I.C. Members

AT a meeting of the Royal Institute of Chemistry of Great Britain and Ireland (London and S.E. Counties Section) on April 17, at the Royal Institution, Albemarle Street, Piccadilly, W.1, Dr. J. H. Oliver read a paper entitled: "Recent Advances in Brewing Technology."

Dr. Oliver discussed the effect of the absence of foreign barleys, the use of the combine harvester in this country on the problems of malting barley, and the development of air-conditioned maltings. Empirical experience of the past had probably decided the optimum conditions for the brewing process, although in detail there were new systems of wort cooling and yeast collection and storage to which he referred. It was, however, in the production of bottled beer that one was likely to see the greatest changes in brewing technology. The author used colour film to illustrate his lecture, and made a special point of the process of fining because of its chemical interest as the oldest organic hydrolysis practised industrially He concluded by referring to a new system of fermentation which had developed largely as the result of enemy action and was adopted in the floating breweries.

An interesting discussion ensued, in which Messrs. Riddell, Freeland, Daubney, McLachlan, Hymas and others took part.

Personal Notes

SIR HAROLD WEBBE, M.P., has joined the board of Hadfields (Merton), Ltd., paint and varnish manufacturers.

MR. GEORGE J. DENBIGH, M.Sc., F.R.I.C., manager of the Wakefield works of Brotherton & Co., Ltd., has been appointed a director of the company.

PROFESSOR SIR ROBERT ROBINSON, P.R.S., is to be awarded the honorary degree of D.Sc. in the University of Sheffield at the installation of Lord Harewood as Chancellor of the University on June 25.

MR. E. W. LEAN is now chairman and managing director of Associated Clay Industries, Ltd., in place of the late Mr. George du Cros. MR. P. SELLARS has been elected a director.

SIR DAVID RIVETT, chairman of the Australian Council for Scientific and Industrial Research, is heading the group of Australian scientists who are to fly to England shortly with the purpose of co-ordinating Commonwealth talents and resources for peace and defence.

MR. E. B. ANDREWS has been awarded the Rudolph Muspratt Memorial Prize at Widnes Technical College, for the most successful chemistry student of the year. The J. H. E. Evans Prize in chemistry, for the most successful third-year chemistry student, goes to MISS R. CRETNEY.

MR. SYDNEY J. JOHNSTONE, O.B.E., B.Sc., F.R.I.C., M.Inst.M.M., retired on May 5 from the position of Principal, Mineral Resources Department, Imperial Institute, after 40 years' association with the Institute and ten years as principal. His successor is MR. G. E. HOWLING, B.Sc.

PROFESSOR P. C. MITTER, Palit Professor of Chemistry at Calcutta University, since 1938, who is due to retire on May 31, will be succeeded by PROF. P. RAY, now Khaira Professor of Chemistry. The latter post will be filled by DR. J. C. BARDHAN. DR. P. B. SARKAR has been appointed to act as Ghose Professor of Chemistry in place of PROF. J. N. MUKHERJEE, who has accepted the post of Director of the Imperial Agricultural Research Institute, New Delhi.

DR. F. B. THOLE, D.Sc., F.R.I.C., who recently retired from the service of the Anglo-Iranian Oil Co., Ltd., was one of the first two chemists to join the company's research staff at Sunbury in 1917. There he remained until his transfer to the chemical branch at the head office in 1935. Then, in 1942, he was seconded for Government service as Technical Adviser to the British Petroleum Mission in Washington. On his return to this country in July, 1943, he was attached to the Petroleum Division of the Ministry of Fuel and Power in a similar capacity. He has now been retained by this Ministry.

O.C.C.A. Changes

In the Newcastle-on-Tyne Section of the Oil and Colour Chemists' Association, MR. W. P. JENKINS was elected chairman, MR. T. W. J. CHATER vice-chairman, MR. F. J. PRATT, hon. secretary, and MR. G. MURRAY, hon. treasurer. MESSRS. R. GILL, G. C. HUTCHINGS, and H. NICHOLSON were elected to vacancies on the committee.

In the Scottish Section, both the chairman, MR. J. CROMBIE, and the hon. secretary, MR. A. H. WHITAKER, have retired from office. Mr. Crombie had held the chair throughout the war, and Mr. Whitaker had been secretary since the foundation of the Section in 1934.

MR. V. C. THOMPSON has been elected chairman of the Bristol Section of the Oil and Colour Chemists' Association for the ensuing year, and other elections at the recent annual general meeting were as follows: hon. secretary, MR. C. G. PHILLIMORE; hon. publications secretary, MR. R. M. IRVING; hon. treasurer, MR. R. C. CRANE; committee members, MR. W. G. WADE, MR. W. L. LEWIS, MR. H. K. TURNBULL, A.R.I.C., MR. G. F. PAGET, DR. MARSDEN.

Obituary

MR. HENRY MARTIN WOOD, whose death at the age of 57 occurred recently, was a director of Keiner & Co., Ltd., of Mitcham, manufacturers of chemicals for the leather trade, whom he joined in 1924.

Alginic Acid

British Columbia Seaweed Project

DISCUSSION in the British Columbia legislature of a bill to provide a licensing system for the seaweed industry reveals that three firms are already interested in seaweed products, and one of them, a British chemical firm, wishes to develop alginic acid from British Columbia kelp. It is claimed that among the developments already made possible by this acid are production of moulded articles impervious to most acids and solvents and capable of being processed at lower temperatures than other plastics, artificial silk, transparent paper, and a wool cloth whose exceptional quality is due to the use of untwisted yarn with a soluble alginate sizing.

Of the two other companies interested, one wishes to produce mineral salt tablets for human consumption and another, which already makes agar from seaweed, is showing interest in a variety of the genus Gracilaria, found on the British Columbia coast, and said to have a high agar content.

General News

From Week to Week

Full details of the iron and steel industry's seven-and-a-half years' plan for its own reorganisation and modernisation at a cost of £168,000,000 are given in a Government White Paper published on Tuesday.

New members elected to the Parliamentary and Scientific Committee are: Sir Arthur Salter, M.P.; Dr. J. Corbett, M.P.; the Earl of Craven; and the Royal Agricultural Society of England.

A summer school in X-ray crystallography will be held at Cambridge University from September 2-13 inclusive. Details are obtainable from Mr. G. F. Hickson, M.A., Secretary of the Board of Extra-Mural Studies, Stuart House, Cambridge.

There will be no change in the present prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the four weeks ending June 1, 1946, according to a Ministry of Food announcement.

The official address of the Export Licensing Branch (Board of Trade) is now Stafford House, 14-20 King William Street, London, E.C.4 (MANsion House 4555), to which address all communications should be sent.

The purchase of 30,000 tons of copper from Chile in the first half of this year is announced by the Ministry of Supply. This is in addition to its purchases of virgin copper from Rhodesia, the Belgian Congo and Canada in the same period, already announced.

The heavy chemical industry was among the principal industries in which wages were increased during the first three months of this year. Altogether, the wage increases totalled £831,300 and affected 2,320,000 people, according to the *Ministry of Labour Gazette*.

The Minister of Food announces his intention of revoking, with effect from June 30, 1946, the Vitamin B_1 (Control) Order, 1941 (S.R. & O., 1941, No. 183), which provides for the control of the manufacture, production, sale and use of Vitamin B_1 for any purpose except medicinal, pharmaceutical or scientific purposes.

It was announced on April 10 that the Minister of Supply would from that date sell virgin aluminium of 99 per cent. to 99.5 per cent. purity at £67 per ton, delivered into consumers' works, with premiums for purities. Prices per ton for metal of higher purity than 99.5 per cent. are: 99.6 per cent., £75; 99.7 per cent., £79; 99.8 per cent., £84; 99.9 per cent., £117; 99.99 per cent., £167.

Recently issued Government orders include: Silicosis and Asbestosis (Medical Arrangements) Amendment Scheme (S.R. & O., 1946, No. 591); Various Industries (Silicosis) Amendment (No. 2) Scheme (S.R. & O., 1946, No. 592); and Asbestos Industry (Asbestosis) Amendment Scheme (S.R. & O., 1946, No. 593).

At a meeting of the Tees Conservancy Commission this week, it was announced that a satisfactory arrangement had been reached between the Commission and I.C.I., Ltd., with regard to river access, so far as their separate interests were concerned in the land at Wilton (where industrial developments are to take place). I.C.I. had withdrawn their petition against the Tees Conservancy Bill, and any differences with parties who sought protective clauses in the Bill had been cleared up. The Bill was set down for hearing on May 28.

Reed Bros. (Engineering), Ltd., announce that they have just occupied a new works at Cuba Street, Millwall, London, E.14, with a total floor space of 20,000 sq. ft., equipped with overhead travelling cranes suitable for handling heavy machinery. This will enable them to deal adequately with their expanding business of reconditioning, converting and manufacturing hydraulic, plastics and rubber, and chemical plant and machinery. Correspondence should continue to be addressed to their City office at Bevis Marks House, E.C.3.

A warm welcome has been accorded in South Africa to the Food Machinery, Industrial and Export Group of the Society of Chemical Industry, consisting of Mr. E. H. Gilpin and Mr. Norman Neville, both of whom have reviewed the Group's activities, especially with regard to exports to that Dominion. Mr. Neville dealt with technical advances in various types of food manufacturing machinery, and Mr. W. A. Willoughby Frye, speaking for the Chambers of Commerce and Industry, promised support to Great Britain by importing all that is possible.

Foreign News

The Swiss national trade exhibition, the first since the war, was officially opened at Basle on May 4.

Shipments of fluorspar from Newfoundland to the United States totalled 10,255.67 long tons in the first nine months of 1945.

Austria's chemical industry is reported to be at present working to 30 per cent. capacity. Since the question of ownership has not yet been clarified, most establishments are managed by public administrators.

The first post-war consignment of 3000 tons of U.S. copper sulphate recently arrived in Bulgaria.

Spain's tin output rose from 650 tons in 1941 to 1500 tons last year, after the domestic price was fixed at 80 pesetas per kg.

Apatite production in Sweden last year reached about 150,000 tons. The ore is concentrated at the Malmberget plant of the Luossavaara Kirunavaara Company.

In Yugoslavia, work has recently started in the restored sodium ammonia plant at Lukavac in Bosnia, one of the largest chemical units in the Balkans. The bauxite mine at Trebinje has also recently been re-opened.

A national research institute for the soda industry—the first in the world—**has** recently been established at Kharkov in the U.S.S.R. It is reported to have done important work in the re-establishment of soda plants in the Donetz Basin.

According to reports from Switzerland, negotiations regarding the establishment of a Swiss subsidiary of the well-known Italian rayon group "Snia Viscosa" have been completed successfully. Production is to start at Brig at an early date.

The new rice factory, costing $500,000, which is being built in the Mahaicony District, near Demerara, British Guiana, will not only be capable of milling five tons of rice every hour, but will also deal with valuable by-products.

A patent assigned recently by the U.S. Patent Office to a therapeutic firm provides a method of extracting a stable physiologically standardised preparation of curare suitable for use in the treatment of dystonic and spastic conditions.

Atabrine, effectively used in the suppression of malaria, may now be purchased without a doctor's prescription in retail chemists' shops throughout the U.S.A., under a recent ruling of the Food and Drug Administration, Washington.

Canadian copper producers have contracted to sell their exportable surplus to the U.K. up to the middle of 1946, and they confidently hope to continue in this market, according to statements made by Mr. G. Y. Murdoch, president of Noranda Mines, Toronto, in his annual address to shareholders.

The discovery in the Stanthorpe district of Queensland, of large mineral deposits alleged to contain uranium, caused some excitement, and many leases have been applied for. There is considerable doubt in certain quarters, however, whether the ore, which is manganese oxide, contains radio-active minerals. An examination of the field has been made by the Queensland Department of Mines and a report is expected soon.

The Soviet Scientific Research Institute of Metallurgy has invented a new alloy of great magnetic strength, called "**Magniko.**" It has a magnetic strength 15 times greater than that of tungsten steel, and will be useful in solving a number of technical problems.

Elemental sulphur, so far obtained from volcanic rock, especially in Texas and Sicily, is to be "grown" along the Madras coast near Masulipatam. It was accidently discovered that about half an inch below the top crust of the beach there was available, to a depth of two feet, a layer containing 30 per cent. of elemental sulphur, resulting from the activities of certain micro-organisms. Two sites for sulphur "farms" have already been selected.

A new drug developed in the U.S.A. is claimed to be effective against the liberation of too great an excess of histamine at the nerve endings, a state of affairs which causes asthma, hay fever, etc. The new drug, called Benadyl, is α-dimethylaminoethyl benzhydryl ether hydrochloride. Preliminary tests are stated to have proved effective in 65-75 per cent. of stubborn hay-fever cases, and in a slightly lower proportion of asthma cases.

The discovery and investigation of deposits of sillimanite in South Carolina has led to the estimate that up to 20,000 tons may be utilised per annum at a cost of $20 to $35 per ton. Ore samples showed a 25 per cent. content of the mineral, which is highly suitable for the manufacture of refractories and for other purposes where high resistance to heat and to chemical attack, and a low coefficient of expansion are required.

The Société Anonyme Wild-Barfield (165 Rue Belliard, Brussels), a new company formed in Brussels and controlled by Wild-Barfield Electric Furnaces, Ltd., will handle the sales and service of Wild-Barfield furnaces in Belgium, Holland and Luxembourg, and represent also the associated company, G.W.B. Electric Furnaces Limited, in the same territory. The new company will also handle Eternite case-hardening compound as well as other equipment for hardening shops, metallurgical laboratories, etc.

Forthcoming Events

May 11. Institution of Factory Managers (North Midlands branch). Royal Victoria Station Hotel, Sheffield, 2.30 p.m. Cdr. Irvine, R.N. (retd.): "Man and Management."

May 13. Tar Industry Meetings. Queen's Hotel, Leeds, 1, 4 p.m., National Road Tar Committee; 6 p.m., National Pitch Committee.

May 14. Tar Industry Meetings. Queen's Hotel, Leeds, 1, 10 a.m., National Creosote Executive Committee; 2.15 p.m., A.T.D. Executive Committee.

May 14. Institution of Chemical Engineers and the **Chemical Engineering Group.** Rooms of the Geological Society, Burlington House, Piccadilly, London, W.1, 5.30 p.m. Mr. D. J. Pull: "Instrumentation in Plant Control."

May 15. Tar Industry Meetings. Queen's Hotel, Leeds, 1, 9.45 a.m., A.T.D. general meeting; 11.30 a.m., N.C.C. (all subscribers); 2.30 p.m., B.R.T.A. extraordinary general meeting, followed by council meeting.

May 15. Royal Society of Arts. John Adam Street, Adelphi, London, W.C.2, 5 p.m. Dr. C. S. Gibson: "The Life and Work of Sir William Jackson Pope, K.B.E., F.R.S." (The Sir William Jackson Pope Memorial Lecture).

May 16. Tar Industry Meetings. Queen's Hotel, Leeds, 1, 9.30 a.m., Pitch Supply Association; Pitch Marketing Co., Ltd.

May 16. Institute of Fuel (East Midland Section). Gas Department, Parliament Street, Nottingham, 5.15 p.m. Annual general meeting, followed at 6 p.m. by joint meeting with National Smoke Abatement Society, etc. Mr. S. N. Duguid: "Prevention of Industrial Smoke."

May 17. British Association of Chemists. Central Library, St. Peter's Square, Manchester, 2. Prof. P. M. S. Blackett: "The Social Implication of Recent Discoveries Regarding Atomic Energy." (Annual B.A.C. Lecture.)

May 21. Association of Supervisory Staffs and Engineering Technicians. Central Hall, Westminster, London. Mr. Herbert Morrison, M.P., Mr. Ian Mikardo, M.P., Mr. Julius Silverman, M.P.: "The Government's Prosperity Campaign."

May 22. Society of Chemical Industry (Chemical Engineering Group). Waldorf Hotel, Aldwych, London, W.C.2, 12 noon. Annual general meeting, followed by luncheon; address by Dr. H. Levinstein.

May 23, 24 and 25. Society of Dyers and Colourists. The University, Leeds, 10.30 a.m. Symposium on Fibrous Proteins, Natural and Synthetic (*see* THE CHEMICAL AGE, April 20, 1946, p. 422).

May 23. Society of Chemical Industry (Plastics Group). Stewart's Restaurant, 50 Old Bond Street, London, W.1, 5 p.m., annual general meeting; 5.45 p.m., evening meal. Burlington House, Piccadilly, London, W.1, 7 p.m. Mr. N. J. L. Megson and Mr. A. K. Unsworth, with Mr. V. E. Yarsley and Mr. W. J. Grant: "The Tropical Behaviour of Cellulose Acetate Films."

May 24. Royal Institution of Great Britain. 21 Albemarle Street, London, W.1, 5.15 p.m. Sir Lawrence Bragg: "X-ray Analysis in Research and Practice Today."

May 24. Oil and Colour Chemists' Association (London Section). Manson House, 26 Portland Place, London, W.1, 6.30 p.m. Mr. H. G. Jones: "Some Physico-Chemical Aspects of Plasticiser Action."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

CHEMIKA LTD., Newcastle-on-Tyne, manufacturing chemists, etc. (M., 11/5/46.) April 9, £2000 debenture, to J. Civval, Finchley; general charge. *Nil. Dec. 31, 1944.

NORDAC LTD., London, W., chemical engineers. (M., 11/5/46.) April 8, series of £10,000 debentures, present issue £8000; general charge. *£3250. July 19, 1945.

Company News

United Molasses Co., Ltd., announce net trading profit for 1945 totalling £449,872 (£444,793). Final dividend, 15 per cent. (same), making 22½ per cent. (same).

Associated Clay Industries, Ltd., report trading profit for 1945 totalling £12,802 (£14,105). Preference dividend paid up to December 31, 1939.

British Match Corporation, Ltd., announce profits for the year ended April 30 totalling £349,576 (£347,240). Final dividend, 5½ per cent. (same), plus bonus of 1 per cent. (nil), making 9 per cent. (8 per cent.).

As foreshadowed at the recent annual meeting of the **Anchor Chemical Co., Ltd.,** Manchester, an American subsidiary company has been formed to look after the company's interests in the U.S.A. Known as the British Anchor Chemical Corporation, 2612 Empire State Building, Fifth Avenue, New York, the new undertaking will be in the charge of Mr. A. Grundy, who is going out from England.

Catalin, Ltd., announce trading profit for 1945 totalling £64,903 (£18,715). Credit balance carried forward, £770. No dividend has been paid since the company was formed in 1936.

British Oxygen Co., Ltd., report net profit for 1945 totalling £520,587 (£370,369). Final ordinary dividend, 8 per cent. (same) and special anniversary dividend of 4 per cent. (nil).

Application is being made to deal in both classes of shares of the **Aluminium Plant and Vessel Company.** A pioneer in the development of welding aluminium, the company, which was formed in 1910, is capitalised at £372,138, consisting of £300,000 4½ per cent. cumulative preference £1 shares and £72,138 ordinary 2s. shares.

L. A. Mitchell, Ltd., consulting and chemical engineers, etc., 3 Oakfield Road, Didsbury, Manchester, 20, have increased their nominal capital beyond the registered capital of £2000, by the addition of £23,000. The additional capital is divided into 8000 ordinary and 15,000 preference shares of £1 each.

New Companies Registered

A. E. Stannard, Ltd. (409,196).—Private company. Capital, £1000 in £1 shares. Manufacturers of and dealers in chemicals, oils, colours, etc. Directors: A. E. Stannard; C. H. Scarborough; E. J. Cranshaw. Registered office: 37 Vernon Walk, Tadworth, Surrey.

Superior Plastics Company, Ltd. (409,328). Private company. Capital £3000 in £1 shares. Manufacturers of and dealers in plastics, chemicals, chemical products, etc. Directors: E. J. Earley, F. J. Champion, A. Oldman, B. Leader. Registered office: 199 Piccadilly, W.1.

Overseas Corporation (Great Britain), Ltd. (409,309).—Private company. Capital, £50,000 in 47,000 ordinary shares of £1 and 60,000 management shares of 1s. each. To promote scientific research and investigation, to test, acquire, dispose of and turn to account scientific, chemical, industrial and other inventions, etc. Subscribers: H. G. Steell; A. R. Wood. Solicitors: Lawrance Messer & Co., London, E.C.2.

Chemical and Allied Stocks and Shares

WITH international developments creating a tendency for a waiting attitude, stock market activity has been less pronounced during the past week, although the undertone continued firm. British Funds were moderately higher on balance and further gains prevailed among industrials. A good feature was a general rally in iron and steels, buyers coming in on the view that the recent heavy fall in prices on nationalisation developments had been carried too far.

Shares of chemical and kindred companies were firm and mostly higher compared with a week previously. Imperial Chemical rose further to 44s. 1½d. in response to the proposed big expansion of the dyestuffs section of the group, and B. Laporte at 97s. 6d. were again higher. Greeff-Chemicals 5s. ordinary were 11s. The units of the Distillers Co. rallied to 119s. 9d. on market expectations that the distribution for the past year is likely at least to be maintained, but there has been a sharp reaction to 52s. in United Molasses on the reduced profits shown by the results. Lever & Unilever were 52s. 6d., Turner & Newall 88s. 6d., and, in response to expectations of increasing uses for the metal, British Aluminium at 40s. showed a further rally. British oxygen were good at 96s. 3d. on the full results and consolidated accounts. Shares of companies mainly identified with the building industry came into increased demand, British Plaster Board moving up to 37s. 1½d., Associated Cement to 64s. 9d., and Tunnel Cement to 46s. Pinchin Johnson remained under the influence of the financial results, rising further to 44s. 3d., while Goodlass Wall 10s. ordinary were 31s. 6d., and International Paint 132s. 6d. Borax Consolidated at 47s. 3d. held their rise, General Refractories were 20s. 6d., Imperial Smelting 18s. 6d., and Amalgamated Metal 17s. 6d., while on estimates of future benefits from the abolition of E.P.T., British Industrial Plastics 2s. shares rose further to 9s. 7½d. De La Rue were £11½, Catalin 5s. shares active up to 15s. 3d., and Erinoid at 13s. 6d. have been prominent among shares of companies connected with plastics. Elsewhere, Lawes Chemical 10s. ordinary were 13s. 3d., and Monsanto Chemicals 5½ per cent. preference changed hands at 23s. 6d. E.P.T. abolition prospects continued to attract attention to British Drug Houses, which were active around 65s. 9d. Burt Boulton were 25s., and Morgan Crucible 5 per cent. second preference marked 25s. 6d. Blythe Colour 4s. shares continued around 40s. United Glass Bottle held their rise, changing hands at 83s., Triplex Glass were 42s. 6d., and awaiting the results, Webb's Crystal Glass ordinary developed activity up to 15s. with the deferred shares also higher at 7s.

Prominent in iron and steels was a rally to 25s. 3d. in Dorman Long. Guest Keen also improved to 42s. 9d., Colvilles to 23s. 9d., United Steel to 23s. 9d., and Hadfields to 26s. 3d. Babcock & Wilcox were

62s. 3d., and Stewarts & Lloyds strengthened to 53s. on further consideration of the past year's results. Textiles continued to be helped by the higher J. & P. Coats dividend, Bradford Dyers improving to 26s. 10½d., Calico Printers to 24s. 7½d. and Bleachers to 14s. 7½d.

Boots Drug 5s. ordinary showed firmness at 59s., Beechams deferred were 24s. 3d. on E.P.T. abolition calculations, Sangers 31s. 6d., and Timothy Whites 47s. 6d. German Potash bonds rose strongly on the important part the potash industry is likely to play in future German economy, but best prices were not held, the 7 per cent. stock easing to 53 and the 6½ per cent. to 49.

Oils became less firm, Anglo-Iranian easing to £5, with Shell 83s. 1½d., and Burmah Oil 70s. 7½d.

British Chemical Prices

Market Reports

CONDITIONS throughout the London industrial chemicals market during the past week have been firm and a steady movement against contracts continues to be maintained. A good flow of inquiry for new business is reported from most sections and the export demand is further expanding. The general demand for the potash and soda chemicals is unaltered, with values displaying a firm undertone. There is a steady outlet for textile chemicals and a pressure for supplies of raw materials for the paint industry. Among the acids, oxalic, citric and tartaric are in strong request, while acetone and formaldehyde are in good call. Most of the coal-tar products are difficult to obtain for near delivery dates and the export demand continues on a good scale. Quotations are unchanged at recent levels.

MANCHESTER.—Home trade users of both light and heavy chemical products have been circulating delivery specifications steadily on the Manchester market during the past week, and fresh business in the alkalis and a wide range of other materials has been of fair extent. Additional export inquiry has been an important feature and bookings are being made steadily in all classes of chemicals, including dyestuffs. Prices maintain a firm front in virtually all sections of the market. Among the fertilisers, sulphate of ammonia, superphosphates, and the compound manures are meeting with a steady demand, as are also the leading coal-tar products.

GLASGOW.—Little change can be recorded in the state of trade in the Scottish heavy chemical market during the last week. Prices in a number of instances are still showing a tendency to increase, notably those for caustic soda and salt. The demand for both home and export remains very steady and considerably in excess of supply. The paint and rubber trade raw materials continue to be very short and substitutes are finding a ready market. In the export market considerable interest has been shown in formaldehyde, sulphur, zinc oxide, copper sulphate, toluol, and other heavy chemicals.

Price Changes

Copper Carbonate.—MANCHESTER: £6 15s. per cwt. d/d.

Lead Nitrate.—MANCHESTER: £52 per ton d/d in casks.

Oxalic Acid.—The price 62s. 6d. to 65s. per cwt., quoted in our last issue, should be disregarded.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each. Numbers given under "Applications for Patents" are for reference in all correspondence up to acceptance of the complete specification.

Applications for Patents

Phosphate compositions.—Albright & Wilson, Ltd. (Hall Laboratories, Inc.) 9918.

Metal electrodeposition.—M. L. Alkan. 9259.

Colouring compositions.—American Cyanamid Co. 9521.

Mineral oils.—9555. Isobutylenic polymers.—9557. Alkylation processes.—9847. Anti-frost compositions.—9849. Hydrocarbons.—9848, 9850. Treatment of hydrocarbons.—9553. Preparation of mercaptans.—9556. Polymers.—9846. C. Arnold. (Standard Oil Development Co.)

Polyesters.—R. G. Bartlett, and Imperial Chemical Industries, Ltd. 9835.

Resinous condensation products.—Beck, Koller & Co. (England), Ltd., E. A. Bevan, and R. S. Robinson. 9535.

Cyclic hydrocarbons.—9777. Tetrahydrofuran.—9778. J. G. M. Bremner, R. K. F. Keeys, and I.C.I., Ltd.

Heterocyclic compounds.—J. G. M. Bremner, D. G. Jones, R. R. Coats, and I.C.I., Ltd. 9776.

Hydrogen peroxide.—Buffalo-Electric-Chemical Co., Inc. 9998.

Esters.—P. W. Carlene, and I.C.I., Ltd. 9834.

Organo-silicon coating compositions.—Corning Glass Works. 9698.

Dyestuffs.—S. Coffey, G. W. Driver, D. A. W. Fairweather, F. Irving, and I.C.I., Ltd. 9314.

Amine compositions.—F. Dawson, J. Swaine, W. Todd, and I.C.I., Ltd. 9313.

Polymeric esters.—J. T. Dickson, R. L. Heath, R. J. W. Reynolds, and I.C.I., Ltd. 9640, 9642.

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Organic nitriles.—E.I. Du Pont de Nemours & Co. (United States, March 30, '45.) 9790.

Polymeric linear esters.—A. S. Fern, and I.C.I., Ltd. 9309, 9310, 9311.

Polymeric linear esters.—A. S. Fern, D. McCreath, E. G. Vickers, T. Vickerstaff, and I.C.I., Ltd. 9312.

Silicon halides.—J. G. Fife. (Dow Chemical Co.) 9853.

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Vitamin A compounds.—Ortho Pharmaceutical Corporation. (United States, Sept. 20, '45.) 9438.

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Working-up of fermentation carbon dioxide under recovery of alcohol.—A/S. Dansk Goerings-Industri. Sept. 11, 1940. 2954/46.

Light-sensitive diazotype material.—Chemische Fabriek L. Van Der Grinten. July 29,1942. 3010/46.

Producing non-siccative resin oils.—R. S. A. Collenges, and J. P. S. Vallee. Aug. 31, 1943. 3037/8/9/46.

Production of styrenes and other products.—Dominion Tar & Chemical Co., ltd. Sept. 29, 1944. 6592/45.

Treatment of polymers.—E.I. Du Pont de Nemours & Co. Sept. 27, 1944. 24472/45.

Compositions comprising vinyl chloride polymers.—E.I. Du Pont de Nemours & Co. Sept. 27, 1944. 24947/45.

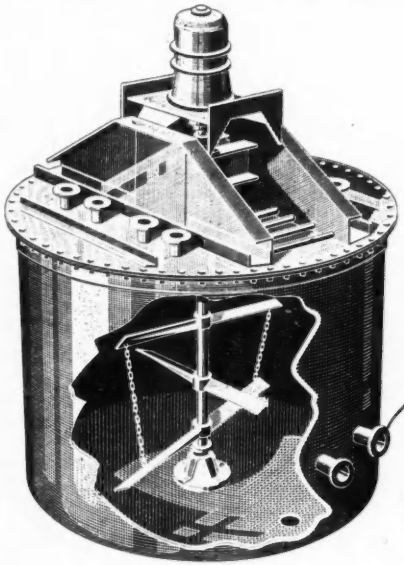
Condensation products of thiourea.—E.I. Du Pont de Nemours & Co. Sept. 29, 1944. 25224/45.

Oxidising primary or secondary alcoholic hydroxyl groups or aldehyde groups.—L. V. Farkas, and O. Schächter. Oct. 1, 1944. 25264/45.

4, 4'-bis Pyrazolone couplers for colour photography.—General Aniline & Film Corporation. Sept. 28, 1944. 23658/45.

Vinyl cyanide.—I.C.I., Ltd. Sept. 27, 1944. 24946/45.

Manufacture of polymers.—I.C.I., Ltd. Sept. 29, 1944. 25222/45.



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Treatment of copolymers.—I.C.I., Ltd. Sept. 29, 1944. 25223/45.

2-Butinediol-1 : 4.—I.C.I., Ltd. Sept. 29, 1944. 25409/45.

Fat-soluble vitamin concentrates.—National Oil Products Co. Sept. 28, 1944. 24645/45.

Condensation of ketene with keto esters or diketones.—Purdue Research Foundation. Oct. 2, 1944. 25496/7/45.

Penicillin extraction process.—Shell Development Co. Sept. 26, 1944. 19546/45.

Electrolytic processes for recovering the metals contained in copper-alloy scrap.—Sirco A.G. Sept. 28, 1944. 24293/45.

Continuous crystallisation with chemical action.—Solvay & Cie. July 31, 1943. 2772/46.

Stabilisation of organic substances of high molecular weight containing combined halogen.—N.V. de Bataafsche Petroleum Mij. July 12, 1944. 2290/46.

Manufacture of aqueous solutions of insecticides of vegetable origin.—N.V. de Bataafsche Petroleum Mij. Dec. 3, 1940. 2409/46.

Construction of tube systems consisting of lead alloys with lead basis.—S.A. Appareils & Evaporateurs Kestner. April 6, 1943. 2291/46.

Apparatus for the treatment of a solid with a liquid giving rise to a solid precipitate.—S.A. Appareils & Evaporateurs Kestner. Dec. 7, 1943. 2299/46.

Nitro phosphates.—S.A. des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny & Cirey. July 23, 1943. 20192/45.

Preparation of cyclic amino alcohols.—Soc. des Usines Chimiques Rhône Poulenc. Jan. 13, 1944. (Cognate application 23053/45.) 23052/45.

Production of metals, such as magnesium, by the condensation of their vapours.—Soc. Electro-Metallurgique du Planet. July 12, 1941. (Cognate application 2423/46.) 2422/46.

Combinations of filaments having a basis of super-polyamides.—Soc. Rhodiaceta. April 28, 1943. 1819/46.

Continuous cyclic system for conducting catalytic reactions.—Socony-Vacuum Oil Co., Inc. Sept. 22, 1944. 7192/45.

Purification of organic liquids.—Standard Oil Development Co. Aug. 1, 1941. 8920/42.

Process of manufacturing alkyloxy and alkenyloxy-2 nitro-5 anilines or salts of the same.—A. P. Weber. May 11, 1944. 2258/46.

Production of *dl*-histidine and to intermediates therefor.—Winthrop Chemical Co., Inc. Sept. 22, 1944. 25802/45.

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Production of derivatives of synthetic linear polyamides.—E.I. Du Pont de Nemours & Co. June 3, 1942. 576,363.

Manufacture of coatings and shaped articles from synthetic linear polyamides.—E.I. Du Pont de Nemours & Co. June 3, 1942. 576,362.

Hydrazino-1, 3, 5-triazino derivatives of substituted phenylarsenic compounds.—E. A. H. Friedheim. Feb. 3, 1942. 576,361.

Manufacture of monoazo dyestuffs capable of being chromed.—Geigy A.G. May 5, 1942. 576,306.

Yellow azo dyestuffs.—N. H. Haddock, C. Wood, and I.C.I., Ltd. May 8, 1944. 576,270.

Manufacture of amine carbonates and to inhalant preparations containing the same.—E. Lilley & Co. Jan. 15, 1943. 576,340.

Stilboestrol.—R. H. Marriott, and W. W. Myddleton. Aug. 11, 1944. 576 325.

Resinous compositions and abrasives.—Norton Grinding Wheel Co., Ltd. March 20, 1943. 576,330.

Controlled oxidation of unsaturated hydrocarbons.—Shell Development Co. March 27, 1943. 576,255.

Castor oil products and preparation of same.—Shell Development Co. Nov. 24, 1942. 576,316.

Resinous products from castor oil and production of same.—Shell Development Co. Nov. 24, 1942. 576,317.

Purification of organic liquids.—Standard Oil Development Co. Aug. 1, 1941. 576,302.

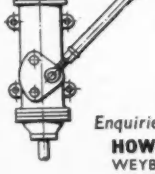
Preparation of argillaceous material for use in the manufacture of pottery, etc.—A. H. Stevens. (Garco Products, Inc.) Dec. 10, 1943. 576,318.

Processes for improving the properties of foils, films, fibres or the like made from alginic acid or water-insoluble alginates.—Tootal Broadhurst Lee Co., Ltd., S. E. Lawton, and F. C. Wood. Dec. 10, 1942. 576,101.

Processes and compositions for the production of alloy irons and steels.—M. J. Udy. July 9, 1942. 576,133.

Process for the isomerisation of saturated hydrocarbons.—Universal Oil Products Co. March 31, 1943. 576,375.

Vinyl halide polymer and copolymer stabilisation.—Wingfoot Corporation. Sept. 14, 1943. 576,293.



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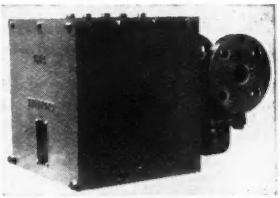

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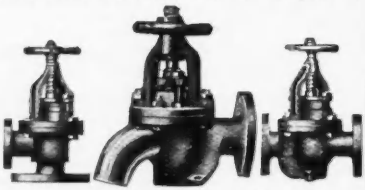

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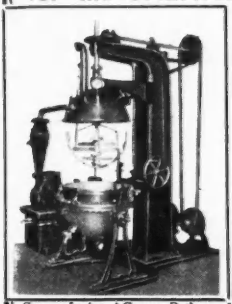

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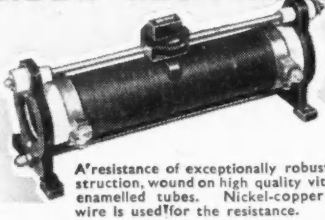

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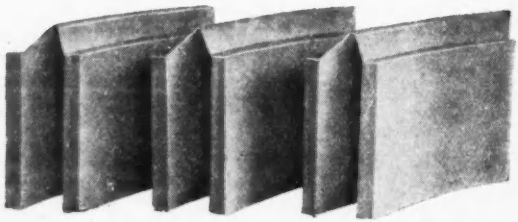

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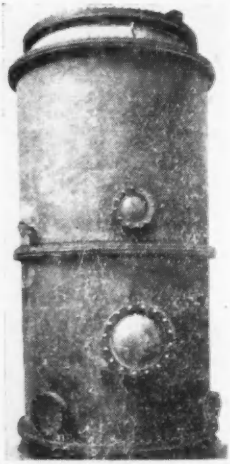

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